



# Graduate Handbook 2013-2014

Department of Bioengineering  
Stanford University

Dear New Bioengineering Graduate Students,

Welcome to Stanford Bioengineering! You are one of 23 outstanding new graduate students who comprise BioE's incoming class of 2013. Each of you was chosen with great care, and as you embark on your studies you can feel confident that you have the strong support of the BioE faculty, and faith in your potential to do great work. We will do all that we can to guide you as you work to break new ground during this invaluable stage of your career. Moreover, we are excited to get to know you! We welcome each one of you warmly to the BioE team.

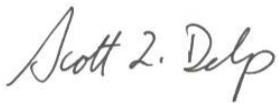
Once you have settled in, we feel certain that you will find limitless intellectual challenges on this one-of-a-kind campus, so that your time at Stanford will pass all too quickly. The BioE faculty look to you and your classmates to enliven and invigorate our department with your excitement to learn, curiosity about science, your unique ideas, and willingness to work harder than you have ever worked in your life. It is our goal to nurture and develop a new generation of bioengineering leaders, who will conceive of novel concepts, technologies, and therapies that will change the world for the better. With the new skills that we will help you to develop, we aim for you to become a powerful new contributor to the field of bioengineering.

As you ready yourself to take on one of the most challenging tasks of your career, I urge you to take advantage of the many special opportunities at Stanford. Meet with your advisors and talk with other faculty, students and staff to better understand the bioengineering environment here. Peruse the course offerings in departments throughout the university. Attend seminars and research meetings in labs of interest. If you are a Ph.D. student, take time to see and understand various research groups to find a research area and style that suits your needs and interests. It is critically important for you to find a lab and advisor who will support your research work, and it takes energy and dedication to make this happen.

This handbook is designed to provide specific information and guidelines on the many aspects and stages of the MS and PhD programs. If you have any questions during your transition, please do not hesitate to contact me or Olgalydia Winegar, Student Services Manager at [owinegar@stanford.edu](mailto:owinegar@stanford.edu), 650-723-8632.

Our congratulations and warm welcome!

Sincerely,

A handwritten signature in cursive script that reads "Scott Delp".

Scott Delp  
Chair of Graduate Studies

## *Table of Contents*

Getting Started	Page 4
Axess	Page 4
Registration	Page 4
Grades	Page 5
Laboratory Safety Training	Page 5
Finances	Page 5
Direct Deposit	Page 6
Loan and External Awards	Page 6
Taxes	Page 6
Health Insurance	Page 6
Master's Degree Program	Page 7
Degree Requirements	Page 8
Example Programs by Focus Area	Page 9
Approved Bioengineering Electives	Page 14
Ph.D. Degree Program	Page 23
Timetable for the Doctoral Degree	Page 23
Combined M.D./Ph.D. Degree	Page 24
Ph.D. First Year Advising/Requirements	Page 25
Teaching	Page 26
Yearly Evaluations	Page 26
Qualifying Exam Process	Page 26
University Ph.D. Requirements	Page 29
Reading Committee	Page 29
Ph.D. Candidacy	Page 29
Terminal Graduate Registration (TGR)	Page 29
University Oral and Dissertation/Graduation Quarter	Page 30
Commencement	Page 31
Personal Leave for Graduate Students/Honor Code	Page 31
Bioengineering Faculty Directory	Page 32
Bioengineering Administration	Page 34
Facilities	Page 34
Mailboxes	Page 35
Student Organizations	Page 35
Places to Get Help/ Campus Computer Resources	Page 36

## *Getting Started*

The [Office of the Vice Provost for Graduation Education \(VPGE\)](#) website is a very useful reference for graduate education at Stanford. Visit the [GAP Handbook](#) at [gap.stanford.edu](http://gap.stanford.edu) for graduate academic policies and procedure.

### **SUNet ID**

The SUNet ID is an account name that identifies each student, uniquely and permanently, as a member of the Stanford community. It is what is used to log into Stanford computer systems. Computing and Communication is a central source for information about Stanford's technology-based tools, from software and servers to cell phones and networks.

### *AXESS*

<http://axess.stanford.edu>

This is the University's web based administrative system wherein most student business is conducted. Students must use Axess to accomplish the following tasks:

- File or adjust a study list (the list of courses in which you wish to enroll) and elect grading options each quarter
- Confirm, through Axess, that the University has your correct address and telephone number
- Update Emergency Contact Information
- Print a history of courses and grades
- Check registration status each quarter (e.g. pending holds)
- Review Grades
- Ensure University bill is paid
- Apply to graduate in final quarter

Axess also provides students with the following services:

- Official transcript request
- Campus housing application
- Print an Enrollment Certification

### *Registration*

**Students must be "in status" by 5:00 p.m. on the first day of classes each quarter.** This means that, at the end of the first day of classes in each quarter a graduate student must be enrolled in no fewer than 8 units. Students not "in status" by 5:00 p.m. on the first day of classes are subject to a \$200 late study list fee. Please review the new Academic Deadlines at the following link:

<https://studentaffairs.stanford.edu/registrar/academic-calendar-1314>

These deadlines can also be found on your login page on Axess.

### **For PhD Students Only**

The department requires that all students in the Ph.D. program register autumn, winter, spring and summer quarters. Depending on the funding source, Ph.D. students in

Bioengineering will register for **10** units per quarter. Most funding, including the NSF predoctoral fellowship, pays for a maximum of 10 units. MSTP students should consult their Program Coordinator, [Lorie Langdon](#).

Units for individual courses may vary depending on how the course is organized each year. You need not register for research units (BIOE 391, BIOE 392) unless you need the extra units to total 10.

All students are strongly encouraged to read and keep as a reference the [Stanford Bulletin](#) which is available on-line at <http://bulletin.stanford.edu>.

### *Grades*

Stanford allows a student the option of taking a course for a letter grade or for credit/no credit. Students are required to ask for grades in all courses when available. Please consult with the faculty member regarding the grading type for research courses (BIOE 391, 392).

Students are responsible for making sure grades are reported. If incomplete grades (I), grades not reported (GNR) or no credits (NC) appear on their transcripts, students should check with their instructor immediately. The Student Service Office can assist students in clearing any missing grades.

*For Medical Students Only:*

Medical students are required to take courses Pass/Fail, but need to keep a record of letter grades they would have received. Students should ask their instructors for an e-mail or letter stating the grade that was awarded, for purposes of computing the GPA.

### *Laboratory Safety Training*

Every person working in a laboratory is required by various agencies to be trained in all aspects of laboratory safety. During Orientation Week, it is mandatory that new graduate students take the on-line University Laboratory Safety Training in Axess via the Training tab. Prior to working in the lab, new graduate students are required to complete 1) General Safety and Emergency Preparedness (EHS-4200), 2) Chemical Safety for Laboratories (EHS-1900), Biosafety (EHS-1500), and Compressed Gas Safety (EHS-2200).

### *Finances*

[Stanford ePay](#), the University's online billing and payment services, provides a convenient way for students to view their student bill and make a payment. If you have any questions regarding your student bill, please contact the Student Service Office in Clark S-166.

### **Check Distribution/Information**

Students with research, teaching or course assistantships will be on the regular University payroll. Checks will be available in the Department's Student Service Office on the 7th and 22nd of each month, or the preceding work day if these dates fall on a weekend or holiday.

Your salary is taxable and will be withheld as you request on the W-4 Tax Data form. This form and other payroll forms will be available to complete at orientation.

Students not on an assistantship are paid on a quarterly basis and have their checks mailed to their home address each quarter on the first day of classes. **Please make sure to update your mailing address on Axess.** Students must complete all registration and financial paperwork, pay registration fees, and satisfy all stipulated departmental requirements before receiving stipend checks. No taxes are withheld, but the stipend is reportable and taxable.

#### Direct Deposit

Stipend Checks and bi-weekly assistantship checks may be direct-deposited in local banks. Students can enroll for direct deposit on Axess. Click on "[Enrollment Instructions](#)" for more information.

Holds: Stipend checks will not be issued if University requirements such as submission of the federal employment eligibility form, federal and state tax withholding certificate, and patent agreement form, or if departmental requirements have not been fulfilled. Outstanding bills from the library, University, or Vaden Health Center will also result in holds. Holds must be cleared with the originating office before stipend checks will be issued.

#### **Loans and External Awards**

Graduate Students who believe they will require loan assistance can apply for federal Stafford Student Loan, Federal Perkins Loan, and University loan programs. Inquiries for publications outlining loan program terms can be directed to the [Financial Aid Office](#), Montag Hall, 355 Galvez Street, Stanford, CA 94305; phone 650-723-3058. International students who are not permanent residents are not eligible for long-term loans. Graduate Fellowships awarded by external sources (i.e. NSF, NDSEG, Ford) are also administered in Montag Hall.

#### **Taxes**

Tax information (limited) is available in [The Student Financial Gateway](#) and The [Bechtel International Center](#) (for international students)

### *Health Insurance*

At the start of each academic year, students will be automatically enrolled in Cardinal Care in their first registered quarter (Autumn Quarter). At that time, and that time only, they will be able to waive Cardinal Care for the rest of the year by documenting equivalent health insurance in Axess by September 15, 2013. The decision made at the start of each academic year will be applied to the remainder of that year.

To waive out of Cardinal Care a student must enter Axess and follow the health insurance waiver link and complete the steps indicated. A health plan name and group policy number are required to complete the health insurance waiver. A student must waive health insurance for the entire academic year.

Contact Info: 723-2135, Email: [healthinsurance@stanford.edu](mailto:healthinsurance@stanford.edu)

## *Master's Degree Program Overview*

The Master of Science in Bioengineering requires 45 units of coursework.

The curriculum consists of core bioengineering courses, technical electives, seminars and unrestricted electives. Core courses focus on quantitative biology and biological systems analysis. Approved technical electives are chosen by a student in consultation with his/her graduate advisor, and can be selected from graduate course offerings in mathematics, statistics, engineering, physical sciences, life sciences, and medicine. Seminars highlight emerging research in bioengineering and provide training in research ethics. Unrestricted electives can be freely chosen by the student in association with his/her advisor.

It is expected that the requirements for the M.S., Bioengineering can be completed within approximately one year. There is no thesis requirement for the M.S.

### Program Proposal

Students are expected to meet with their assigned advisor to construct a coherent program in a specific focus area. To ensure that an appropriate program is pursued, all MS students are required to file a "Program Proposal for a Master's Degree" to the Student Service Office by **October 28, 2013**.

### Instructions:

1. Obtain the Program Proposal for a Master's Degree Form
2. Type or print neatly. Course Titles and units are to be included.
3. Consult with your advisor and obtain his/her signature.
4. Submit the form to the Student Service Office for review and final approval of the Chair of Graduate Studies.
5. Proposals can take up to 14 working days to be reviewed and processed. ACESS will indicate the approval of your proposals.

All programs are subject the approval of the student's advisor and the Chair of Graduate Studies.

### Program Proposal Revision:

Students who alter their MS program must submit a new program proposal by the third week of their final quarter. All program revisions are subject the approval of the student's advisor and the Chair of Graduate Studies.

#### *Note to All M.S. Students:*

\*All research units applied toward the Masters Degree program requirements must be completed with Stanford faculty.

#### *Notes to BS/MS (coterminal) Students:*

\*No courses taken more than two quarters before admission to the M.S. program may be used to meet the department's minimum 45-unit requirement for the Master's degree.

\*Course units can only apply toward one degree. You may not count course units toward both the B.S. and M.S. program requirements.

## Master of Science in Bioengineering Degree Requirements - total 45 units

### 1. Core Bioengineering courses – 9 units

BIOE 300A Molecular and Cellular Bioengineering – 3 units (Winter)  
BIOE 300B Physiology and Tissue Engineering – 3 units (Autumn)  
BIOE 301A Molecular and Cellular Engineering Lab – 2 units (Autumn)  
BIOE 301B Clinical Needs and Technology – 1 unit (Winter)

These courses, together with the Approved Technical Electives, should form a cohesive course of study that provides depth and breadth.

### 2. Approved Technical Electives - 26 units

These units must be selected from graduate courses in mathematics, statistics, engineering, physical science, life science, and medicine. They should be chosen in concert with the bioengineering courses to provide a cohesive degree program in a bioengineering focus area. **Students are required to take at least one course in some area of device or instrumentation.** Up to 9 units of directed study and research may be used as approved electives.

### 3. Seminars - 4 units

BIOE 393 Bioengineering Departmental Research Colloquium-1 unit  
BIOE 393 Bioengineering Departmental Research Colloquium-1 unit  
BIOE 393 Bioengineering Departmental Research Colloquium-1 unit  
MED 255 The Responsible Conduct of Research-1 unit

### 4. Unrestricted Electives - 6 units

Students must complete a proposed M.S. degree form listing their proposed courses during their first quarter at Stanford to assure that the planned program provides appropriate depth and breadth. The student's faculty advisor and the Associate Chair for Graduate Studies must approve this list of courses.

To assist you in constructing a program of study for your M.S. degree, we have prepared example programs that provide depth in a few different areas, including Biomedical Computation, Regenerative Medicine/Tissue Engineering, Molecular and Cell Bioengineering, Biomedical Imaging, and Biomedical Devices. **Working with faculty advisors, students have flexibility to tailor course selections to their areas of interest.** Suggested approved courses are listed after each sample program. For courses not on this list, please consult with your advisor for approval.



**EXAMPLE PROGRAM**  
**M.S. in Bioengineering**  
**Depth in Biomedical Computation**

Core Bioengineering Courses

BIOE 300A	Molecular and Cellular Bioengineering - 3 units
BIOE 300B	Physiology and Tissue Engineering- 3 units
BIOE 301A	Molecular and Cellular Engineering Lab - 2 units
BIOE 301B	Clinical Needs and Technology- 1 unit

9 subtotal

Sample Approved Electives

BIOE 214	Representations and Algorithms for Computational Molecular Biology - 3 units
BIOC 218	Computational Molecular Biology - 3 units
BIOE 212	Intro to Biomedical Informatics Research Methodology - 3 units (Taken 2 <sup>nd</sup> YR)
BIOE 220	Introduction to Imaging and Image-based Human Anatomy-3 units
CS 106X	Programming Abstractions (Accelerated) - 5 units
BIOMEDIN 210	Modeling Biomedical Systems - 3 units
BIOE 311	Biophysics of Developmental Biology and Tissue Engineering- 3 units
BIOE 391	Directed Study - 3 units

26 subtotal

Seminars

BIOE 393	Bioengineering Departmental Research Colloquium - 1 unit
BIOE 393	Bioengineering Departmental Research Colloquium - 1 unit
BIOE 393	Bioengineering Departmental Research Colloquium - 1 unit
MED 255	The Responsible Conduct of Research - 1 unit

4 subtotal

Sample Unrestricted Electives

BIOE 223	Physics and Engineering of X-Ray Computed Tomography - 3 units
ARTSTUDI 167	Introduction to Animation- 3 units

6 subtotal

TOTAL UNITS 45

**EXAMPLE PROGRAM**  
**M.S. in Bioengineering**  
**Depth in Tissue Engineering/Regenerative Medicine**

Core Bioengineering Courses

BIOE 300A	Molecular and Cellular Bioengineering - 3 units
BIOE 300B	Physiology and Tissue Engineering- 3 units
BIOE 301A	Molecular and Cellular Engineering Lab - 2 units
BIOE 301B	Clinical Needs and Technology- 1 unit

9 subtotal

Sample Approved Electives

BIOE 260	Tissue Engineering - 3 units
ME 335A, B	Finite Element Analysis - 6 units
DBIO 210	Developmental Biology - 4 units
BIOE 485	Modeling and Simulation of Human Movement - 3 units
BIOE 361	Biomaterials in Regenerative Medicine - 3 units
BIOE 220	Introduction to Imaging and Image-based Human Anatomy - 4 units
BIOE 392	Directed Investigation - 3 units

26 subtotal

Seminars

BIOE 393	Bioengineering Departmental Research Colloquium - 1 unit
BIOE 393	Bioengineering Departmental Research Colloquium - 1 unit
BIOE 393	Bioengineering Departmental Research Colloquium - 1 unit
MED 255	The Responsible Conduct of Research - 1 unit

4 subtotal

Sample Unrestricted Electives

CME 200	Linear Algebra with Application to Engineering Computations - 3 units
ARTSTUDI 167	Introduction to Animation- 3 units

6 subtotal

TOTAL UNITS 45

**EXAMPLE PROGRAM**  
**M.S. in Bioengineering**  
**Depth in Molecular and Cell Engineering**

Core Bioengineering Courses

BIOE 300A	Molecular and Cellular Bioengineering – 3 units
BIOE 300B	Physiology and Tissue Engineering- 3 units
BIOE 301A	Molecular and Cellular Engineering Lab – 2 units
BIOE 301B	Clinical Needs and Technology- 1 unit

9 subtotal

Sample Approved Electives

BIOE 260	Tissue Engineering- 3 units
BIOE/CHEMENG 355	Advanced Biochemical Engineering – 3 units
BIOE/CHEMENG 454	Synthetic Biology and Metabolic Engineering – 3 units
BIOE 331	Protein Engineering – 3 units
BIO 230	Molecular and Cellular Immunology – 4 units
CSB 210	Cell Signaling – 4 units
BIOE 392	Directed Investigation – 3 units
BIOE 220	Introduction to Imaging and Image-based Neuro Anatomy – 3 units

26 subtotal

Seminars

BIOE 393	Bioengineering Departmental Research Colloquium – 1 unit
BIOE 393	Bioengineering Departmental Research Colloquium - 1 unit
BIOE 393	Bioengineering Departmental Research Colloquium - 1 unit
MED 255	The Responsible Conduct of Research – 1 unit

4 subtotal

Sample Unrestricted Electives

CHEM 171	Physical Chemistry – 3 units
CHEM 173	Physical Chemistry – 3 units

6 subtotal

TOTAL UNITS 45

**EXAMPLE PROGRAM**  
**M.S. in Bioengineering**  
**Depth in Biomedical Devices**

Core Bioengineering Courses

BIOE 300A	Molecular and Cellular Bioengineering – 3 units
BIOE 300B	Physiology and Tissue Engineering- 3 units
BIOE 301A	Molecular and Cellular Engineering Lab – 2 units
BIOE 301B	Clinical Needs and Technology- 1 unit

9 subtotal

Sample Approved Electives

BIOE 374A	Biodesign Innovation: Needs Finding and Concept Creation – 4 units
BIOE 374 B	Biodesign Innovation: Concept Development and Implementation-4 units
ME 381	Orthopaedic Bioengineering – 3 units
ME 208	Patent Law and Strategy for Innovators and Entrepreneurs-3 units
BIOE 485	Modeling and Simulation of Human Movement- 3 units
ME 300A	Linear Algebra with Applications to Engineering Computations – 3 units
BIOE 220	Introduction to Imaging and Image-based Human Anatomy – 3 units
BIOE 392	Directed Investigation – 3 units

26 subtotal

Seminars

BIOE 393	Bioengineering Departmental Research Colloquium – 1 unit
BIOE 393	Bioengineering Departmental Research Colloquium - 1 unit
BIOE 393	Bioengineering Departmental Research Colloquium - 1 unit
MED 255	The Responsible Conduct of Research – 1 unit

4 subtotal

Sample Unrestricted Electives

CS 106X	Programming Abstractions (Accelerated) – 5 units
ATHLETIC 52	Golf: Advanced Beginning – 1 unit

6 subtotal

TOTAL UNITS 45

**EXAMPLE PROGRAM**  
**M.S. in Bioengineering**  
**Depth in Biomedical Imaging**

Core Bioengineering Courses

BIOE 300A	Molecular and Cellular Bioengineering - 3 units
BIOE 300B	Physiology and Tissue Engineering- 3 units
BIOE 301A	Molecular and Cellular Engineering Lab - 2 units
BIOE 301B	Clinical Needs and Technology- 1 unit

9 subtotal

Sample Approved Electives

EE 261	The Fourier Transform and Its Applications - 3 units
BIOE/RAD 220	Introduction to Imaging and Image-based Human Anatomy- 3 units
EE 369A	Medical Imaging Systems I - 3 units
EE 369B	Medical Imaging Systems II - 3 units
BIOE 222A	Multimodality Molecular Imaging in Living Subjects- 4 units
RAD 226	In Vivo Magnetic Resonance Spectroscopy and Imaging - 3 units
ME 300A	Linear Algebra with Application to Engineering Computations- 3 units
BIOE 392	Directed Investigation - 4 units

26 subtotal

Seminars

BIOE 393	Bioengineering Departmental Research Colloquium - 1 unit
BIOE 393	Bioengineering Departmental Research Colloquium - 1 unit
BIOE 393	Bioengineering Departmental Research Colloquium - 1 unit
MED 255	The Responsible Conduct of Research - 1 unit

4 subtotal

Sample Unrestricted Electives

EE 268	Introduction to Modern Optics - 3 units
ME 335A	Finite Element Analysis - 3 units

6 subtotal

TOTAL UNITS 45

<b>Suggested Approved Elective Courses</b>				
<i>Biology Courses</i>				
<b>Course Number</b>	<b>Course Name</b>	<b>Units</b>	<b>Quarter Offered</b>	<b>Area:</b>
BIO 104/200	Advanced Molecular Biology	5	Win	MOL
BIO 141 "Same as Stats 141"	Biostatistics	4-5	Aut	BC
BIO 212 "Same as HUMBIO 133, BIO 112"	Human Physiology	4	Win	IM
BIO 214 "Same as BIOC 224, MCP 221"	Advanced Cell Biology	4	Win	BC
BIO 217	Neuronal Biophysics	4	Not given this year	BC, MOL, TE
BIO 230	Molecular and Cellular Immunology	4	Aut	MOL

<i>Biochemistry Courses</i>				
<b>Course Number</b>	<b>Course Name</b>	<b>Units</b>	<b>Quarter Offered</b>	<b>Area:</b>
BIOC 218 "Same as BIOMEDIN 231"	Computational Molecular Biology	3	Aut, Win, Spr	BC

<i>Bioengineering Courses</i>				
<b>Course Number</b>	<b>Course Name</b>	<b>Units</b>	<b>Quarter Offered</b>	<b>Area:</b>
BIOE 123	Optics and Devices Lab	4	Win	BD
BIOE 210 "Same as BIOE 101"	Systems Biology	4	Aut	BC
BIOE 220 "Same as RAD 220"	Introduction to Imaging and Image-based Human Anatomy	3-4	Not given this year	IM
BIOE 222A,B,C	Multimodality Molecular Imaging in Living Subjects	4	Aut (A), Win (B), Spr (C)	BD (A), IM
BIOE 223	Physics and Engineering of X-Ray Computed Tomography	3	Aut	IM
BIOE 226 "Same as RAD 226"	In Vivo Magnetic Resonance Spectroscopy and Imaging	3	Win	IM
BIOE 244	Advanced Frameworks and Approaches for Engineering Integrated Genetic Systems	4	Aut	MOL

BC = Biomedical Computation; BD = Biomedical Devices; IM = Biomedical Imaging;  
MOL = Molecular and Cell Engineering; TE = Tissue Engineering/Regenerative Medicine

BIOE 260	Tissue Engineering	3	Spr	MOL, TE
BIOE 261 "Same as NSUR 261"	Principles and Practice of Stem Cell Engineering	3	Not given this year	MOL, TE
BIOE 281 "Same as ME 281"	Biomechanics of Movement	3	Win	BC, BD
BIOE 283 "Same as ME 244"	Mechanotransduction in Cells and Tissues	3	Aut	TE, MOL
BIOE 291	Principles and Practice of Optogenetics for Optical Control of Biological Tissues	3	Aut	TE, MOL
BIOE 301C	Diagnostic Devices Lab	3	Spr	BD, IM
BIOE 311	Biophysics of Developmental Biology and Tissue Engineering	2-3	Aut	BC, TE
BIOE 325 "Same as RAD 225"	Ultrasound Imaging and Therapeutic Applications	3	Aut	IM
BIOE 331	Protein Engineering	3	Spr	MOL
BIOE 332	Large-Scale Neural Modeling	3	Spr	BC, BD
BIOE 334	Engineering Principles in Molecular Biology	3	Not given this year	BC, MOL
BIOE 335	Molecular Motors I	3	Winter	MOL, BC
BIOE 337	Living Soft Matter	3	Win	MOL
BIOE 355	Advanced Biochemical Engineering	3	Spr	MOL
BIOE 361 "Same as MATSCI 381"	Biomaterials in Regenerative Medicine	3	Not given this year	MOL, TE
BIOE 370	Microfluidic Device Laboratory	2	Win	BD
BIOE 371 "Same as MED 271"	Global Biodesign: Medical Technology in an International Context	1-2	Spr	BD
BIOE 372	Design for Service Innovation	4	Not given this year	BD
BIOE 374A, B "Same as ME 368, MED 272, OIT 581/3"	Biodesign Innovation: Needs Finding and Concept Creation	4,4	Win (A), Spr (B)	BD
BIOE 376	Startup Garage: Design	4	Aut	BD
BIOE 377	Startup Garage: Testing and Launch	4	Win	BD
BIOE 381 "Same as ME 381"	Orthopaedic Bioengineering	3	Aut	TE

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MOL = Molecular and Cell Engineering; TE = Tissue Engineering/Regenerative Medicine

BIOE 386	Neuromuscular Biomechanics	3	Not given this year	TE
BIOE 454 "Same as CHEMENG 454"	Synthetic Biology and Metabolic Engineering	3	Not given this year	MOL
BIOE 485	Modeling and Simulation of Human Movement	3	Spr	BD, TE

<i>Biomedical Informatics Courses</i>				
<b>Course Number</b>	<b>Course Name</b>	<b>Units</b>	<b>Quarter Offered</b>	<b>Area:</b>
BIOMEDIN 200	BMI Colloquium	1	Not given this year	BC
BIOMEDIN 201	Biomedical Informatics Student Seminar	1	Aut, Win, Spr, Sum	BC
BIOMEDIN 210 "Same as CS 270"	Modeling Biomedical Systems: Ontology, Terminology, Problem Solving	3	Win	BC
BIOMEDIN 212 "Same as BIOE 212, CS 272, GENE 212"	Intro to Biomedical Informatics Research Methodology	3	Spr	BC
BIOMEDIN 214 "Same as BIOE 214, CS 274, GENE 214"	Representations and Algorithms for Computational Molecular Biology	3-4	Aut	BC
BIOMEDIN 216	Representations and Algorithms for Molecular Biology: Lectures	1-2	Aut	BC
BIOMEDIN 217 "Same as CS 275"	Translational Bioinformatics	4	Win	BC

<i>Biophysics Courses</i>				
<b>Course Number</b>	<b>Course Name</b>	<b>Units</b>	<b>Quarter Offered</b>	<b>Area:</b>
BIOPHYS 228 "Same as SBIO 228"	Computational Structural Biology	3	Aut	BC, MOL

<i>Civil &amp; Environmental Engineering Courses</i>				
<b>Course Number</b>	<b>Course Name</b>	<b>Units</b>	<b>Quarter Offered</b>	<b>Area:</b>
CEE 274A "Same as CHEMENG174/274"	Environmental Microbiology I	3	Aut	MOL
CEE 274B	Microbial Bioenergy Systems	3	Win	MOL

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MOL = Molecular and Cell Engineering; TE = Tissue Engineering/Regenerative Medicine



<i>Computational &amp; Mathematical Engineering Courses</i>				
<b>Course Number</b>	<b>Course Name</b>	<b>Units</b>	<b>Quarter Offered</b>	<b>Area:</b>
CME 200 "Same as ME 300A"	Linear Algebra with Application to Engineering Computations	3	Aut	BC, BD, TE, IM
CME 204 "Same as ME 300B"	Partial Differential Equations in Engineering	3	Win	BC, BD, TE
CME 206 "Same as AA 214A, ME 300C"	Introduction to Numerical Methods for Engineering	3	Spr	BC, BD, TE
CME 302	Numerical Linear Algebra	3	Aut	BC
CME 306	Numerical Solution of Partial Differential Equations	3	Spr	BC

<i>Computer Science Courses</i>				
<b>Course Number</b>	<b>Course Name</b>	<b>Units</b>	<b>Quarter Offered</b>	<b>Area:</b>
CS 161	Design and Analysis of Algorithms	3-5	Aut, Spr, Sum	BC
CS 221	Artificial Intelligence: Principles and Techniques	4-Mar	Aut, Sum	BC
CS 223A "Same as ME 320"	Introduction to Robotics	3	Win	BC
CS 224N "Same as LINGUIST 284"	Natural Language Processing	3-5	Aut	BC
CS 227	Knowledge Representation and Reasoning	3	Not given this year	BC
CS 228	Probabilistic Graphical Models: Principles and Techniques	3-4	Win	BC
CS 248	Interactive Computer Graphics	3-4	Win	BC
CS 262 "Same as BIOMEDIN 262"	Computational Genomics	3	Win	BC
CS 273A "Same as BIOMEDIN 273A, DBIO 273A"	A Computational Tour of the Human Genome	3	Aut	BC
CS 279	Computational Methods for Analysis and Reconstruction of Biological Networks	3	Not given this year	BC
CS 348A	Computer Graphics: Geometric Modeling	3-4	Win	BC

BC = Biomedical Computation; BD = Biomedical Devices; IM = Biomedical Imaging;  
MOL = Molecular and Cell Engineering; TE = Tissue Engineering/Regenerative Medicine

CS 374 "Same as BIOMEDIN 374"	Algorithms in Biology	2-3	Spring	BC
CS 468	Geometry Processing Algorithms	3	Spr	BC

***Chemical & Systems Biology Courses***

<b>Course Number</b>	<b>Course Name</b>	<b>Units</b>	<b>Quarter Offered</b>	<b>Area:</b>
CSB 210	Cell Signaling	4	Win	BC, MOL, TE
CSB 240A, B	A Practical Approach to Drug Discovery and Development	3	Not given this year	MOL

***Developmental Biology Courses***

<b>Course Number</b>	<b>Course Name</b>	<b>Units</b>	<b>Quarter Offered</b>	<b>Area:</b>
DBIO 201	Development and Disease Mechanisms	4	Aut	TE
DBIO	Developmental Biology	4	Spr	TE

***Electrical Engineering Courses***

<b>Course Number</b>	<b>Course Name</b>	<b>Units</b>	<b>Quarter Offered</b>	<b>Area:</b>
EE 168	Introduction to Digital Image Processing	3-4	Win	IM
EE 225	Bio-chips, Imaging and Nanomedicine	3	Win	IM
EE 236A	Two-Dimensional Imaging	3	Aut	IM
EE 261	The Fourier Transform and Its Applications	3	Aut, Win	IM
EE 268	Introduction to Modern Optics	3	Not given this year	BD, IM
EE 355	Imaging Radar and Applications	3	Win	IM
EE 368	Digital Image Processing	3	Aut, Win, Spr	IM
EE 369A	Medical Imaging Systems I	3	Win	IM
EE 369B	Medical Imaging Systems II	3	Not given this year	IM
EE 376A "Same as STATS 376A"	Information Theory	3	Win (A)	BC

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MOL = Molecular and Cell Engineering; TE = Tissue Engineering/Regenerative Medicine

EE 418	Topics in Neuroengineering	3	Not given this year	BC, BD
EE 469B	RF Pulse Design for Magnetic Resonance Imaging	3	Not given this year	IM

***General Engineering Courses***

<b>Course Number</b>	<b>Course Name</b>	<b>Units</b>	<b>Quarter Offered</b>	<b>Area:</b>
ENGR 206	Control System Design	3-4	Not given this year	BC

***Genetics Courses***

<b>Course Number</b>	<b>Course Name</b>	<b>Units</b>	<b>Quarter Offered</b>	<b>Area:</b>
GENE	Genomics	3	Win	BC

***Immunology Courses***

<b>Course Number</b>	<b>Course Name</b>	<b>Units</b>	<b>Quarter Offered</b>	<b>Area:</b>
IMMUNOL 205	Immunology in Health and Disease	3-4	Win	TE

***Materials Science & Engineering Courses***

<b>Course Number</b>	<b>Course Name</b>	<b>Units</b>	<b>Quarter Offered</b>	<b>Area:</b>
MATSCI 210 "Same as MATSCI 190"	Organic and Biological Materials	3-4	Spr	BD, TE
MATSCI 380	Nano-Biotechnology	3	Not given this year	TE

***Molecular & Cellular Physiology Courses***

<b>Course Number</b>	<b>Course Name</b>	<b>Units</b>	<b>Quarter Offered</b>	<b>Area:</b>
MCP 222 "Same as BIO 152"	Imaging: Biological Light Microscopy	3	Win	IM
MCP 256	How Cells Work: Energetics, Compartments, and Coupling in Cell Biology	4	Not given this year	MOL, TE

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MOL = Molecular and Cell Engineering; TE = Tissue Engineering/Regenerative Medicine

<i>Mechanical Engineering Courses</i>				
<b>Course Number</b>	<b>Course Name</b>	<b>Units</b>	<b>Quarter Offered</b>	<b>Area:</b>
ME 208	Patent Law and Strategy for Inventors and Entrepreneurs	3-4	Aut	BD
ME 218A	Smart Product Design Fundamentals	4-5	Aut	BD
ME 218B	Smart Product Design Applications	4-5	Win	BD
ME 218C	Smart Product Design Practice	4-5	Spr	BD
ME 220	Introduction to Sensors	3-4	Spr	BD
ME 280 "Same as BIOE 280"	Skeletal Development and Evolution	3	Not given this year	BD
ME 287	Mechanics of Biological Tissue	3	Spr	BD, TE
ME 294	Medical Device Design	1	Aut	BD
ME 309	Finite Element Analysis in Mechanical Design	3	Not given this year	BD
ME 310A, B, C	Project-based Engineering Design, Innovation, and Development	4	Aut (A), Win (B), Spr (C)	BD
ME 318	Computer-Aided Product Creation	4	Aut, Win, Spr	BD
ME 331A "Same as AA 242A"	Advanced Dynamics and Computation	3	Win	BC
ME 331B	Advanced Dynamics, Simulation & Control	3	Spr	BC
ME 335A,B	Finite Element Analysis	3	Win(A), Not given this year (B)	BD, TE
ME 335C	Finite Element Analysis	3	Sum	BD
ME 351A, B	Fluid Mechanics	3	Aut (A), Win (B)	BD, TE
ME 354	Experimental Methods in Fluid Mechanics	4	Aut	BD, TE
ME 381 "Same as BIOE 381"	Orthopaedic Bioengineering	3	Aut	BD
ME 382A	Biomedical Engineering in Research & Development	4	Not given this year	BD, TE
ME 382B	Medical Device Design	4	Not given this year	BD, TE
ME 385	Tissue Engineering Lab	1-2	Not given this year	BD, TE

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ME 387	Soft Tissue Mechanics	3	Not given this year	BD, TE
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<i>Medicine Courses</i>				
Course Number	Course Name	Units	Quarter Offered	Area:
MED 217	Technological Frontiers in Digestive Diseases	1	Not given this year	BD
MED 276	Careers in Medical Technology	2-3	Not given this year	BD

<i>Management Science &amp; Engineering Courses</i>				
Course Number	Course Name	Units	Quarter Offered	Area:
MS&E 152	Introduction to Decision Analysis	3-4	Spr	BC
MS&E 211	Linear and Nonlinear Optimization	3-4	Aut	BC
MS&E 250A	Engineering Risk Analysis	3	Win	BD
MS&E 256	Technology Assessment and Regulation of Medical Devices	1-3	Spr	BD
MS&E 273	Technology Venture Formation	3-4	Aut	BD
MS&E 277	Creativity and Innovation	3-4	Spr	BD
MS&E 310	Linear Programming	3	Aut	BD
MS&E 380	Doctoral Research Seminar in Organizations	3	Aut	BD

<i>Neurobiology Courses</i>				
Course Number	Course Name	Units	Quarter Offered	Area:
NBIO 206	The Nervous System	7-8	Win	BC, TE
NBIO 254 "Same as BIO 254"	Molecular and Cellular Neurobiology	5	Not given this year	BC

<i>Neurobiology &amp; Neurological Sciences Courses</i>				
Course Number	Course Name	Units	Quarter Offered	Area:
NENS 220	Computational Neuroscience	4	Not given this year	BC

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<i>Radiology Courses</i>				
<b>Course Number</b>	<b>Course Name</b>	<b>Units</b>	<b>Quarter Offered</b>	<b>Area:</b>
RAD 226 "Same as BIOE 226"	In Vivo Magnetic Resonance Spectroscopy and Imaging	3	Win	IM
RAD 227 "Same as BIOPHYS 227"	Functional MRI Methods	3	Win	IM

<i>Structural Biology Courses</i>				
<b>Course Number</b>	<b>Course Name</b>	<b>Units</b>	<b>Quarter Offered</b>	<b>Area:</b>
SBIO 241 "Same as BIOC 241, BIOPHYS 241"	Biological Macromolecules	3-5	Spr	BC, MOL

<i>Statistics Courses</i>				
<b>Course Number</b>	<b>Course Name</b>	<b>Units</b>	<b>Quarter Offered</b>	<b>Area:</b>
STATS 166 "Same as GENE 245"	Computational Algorithms for Statistical Genetics	2-3	Not given this year	BC

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MOL = Molecular and Cell Engineering; TE = Tissue Engineering/Regenerative Medicine

## *The Ph.D. Degree Program Overview*

A total of 135 units are required for the Ph.D. degree. A student studying for the Ph.D. degree must complete a master's degree (45 units) and must, in essence, fulfill the requirements for the Stanford M.S. degree in Bioengineering. Up to 45 units of master's degree residency units may be counted towards the degree. The maximum number of transfer units is 45. Students admitted to the Ph.D. program with an M.S. degree must complete at least 90 units of work at Stanford.

In addition to the course requirements of the M.S. degree, doctoral candidates must complete a minimum of 15 additional units of approved formal course work (excluding research, directed study, and seminars). Students are required to ask for grades in all courses when available. Please consult with the faculty member regarding the grading type for research courses.

The Department of Bioengineering doctoral program is designed to bring together in one department the cadre of faculty who perform bioengineering research and teach bioengineering courses. Our mission is to train students at the intersection of biomedicine and engineering in both academia and the burgeoning biomedical and biotechnology industries.

### **Timetable for the Doctoral Degree**

The doctoral degree requires a novel and creative research dissertation, and thus is difficult to schedule on an exact timeline. It is expected that the doctoral degree will require approximately five years of full-time study and research following enrollment into the program. Some general guidelines for progress toward the doctoral degree are listed below.

#### **First Year:**

Consult with Advisors; Identify Research Labs in the Department

Apply for Fellowships

Complete Coursework (10 units required each quarter)

Define and Start an Initial Research Project

Identify a Faculty Member Who Agrees to Supervise and Support Your Doctoral Research

Complete First Year Review

#### **Second Year:**

Complete the MS Degree Requirements

Complete Initial Research Project

Pass Qualifying Exam (see procedure below)

Fulfill TA Requirement

Complete Coursework for Doctoral Degree (10 units required each quarter)

#### **Third Year**

Submit Research Work for Publication

Define Dissertation Project

Complete TA Requirement

#### **Fourth Year**

Submit Additional Research Work for Publication

#### **Fifth Year**

Submit Additional Research Work for Publication

Complete your Doctoral Dissertation

Defend your Doctoral Dissertation

#### ***Combined M.D./Ph.D. Degree***

Students interested in a career oriented towards bioengineering and medicine can pursue the combined MD/PhD degree program. Stanford has two ways to do an MD /PhD. US citizens and permanent residents can apply to the Medical Scientist Training Program (contact Lori Langdon, 723-6176) and can be accepted with funding from both MD and PhD with stipend/tuition. They can then select a bioengineering laboratory for their PhD. Students not admitted to the Medical Scientist Training Program must apply and be admitted separately to the MD program and the PhD program of their choice.

The PhD degree is administered by the Department of Bioengineering. To be formally admitted as a PhD degree candidate in this combined degree program, the student must apply through normal departmental channels and must have earned or have plans to earn an MS in bioengineering or other engineering discipline at Stanford or another university. The MS requires 45 units of coursework, which consists of core bioengineering courses, technical electives, seminars, and 6 unrestricted units. In addition, students will be expected to pass the Department of Bioengineering Ph.D. qualifying examination.

For students fulfilling the full MD requirements who earned their master's level engineering/bioengineering degree at Stanford, the Department of Bioengineering will waive its normal departmental requirement of the 15 units applied towards the PhD degree (beyond the master's degree level) be formal course work. Consistent with the University PhD requirements, the department will instead accept 15 units comprised of courses, research, or seminars that are approved by the student's academic advisor and the department chair. Students not completing their MS engineering/bioengineering degree at Stanford will be required to take 15 units of formal course work in engineering related areas, as determined by their academic advisor.

If you have any further questions, please contact Olgalydia Winegar, Student Services Manager at [owinegar@stanford.edu](mailto:owinegar@stanford.edu).



## *PhD First Year Advising*

### *Autumn Quarter*

Students will be assigned an initial faculty advisor on the basis of the research interests expressed in their application. Initial faculty advisors will assist students in selecting courses and identifying research opportunities. To ensure that an appropriate program is pursued, students will submit the following advising form by **October 28, 2013**:

- 1) Students completing the bioengineering master's degree (45 units) and studying for the Ph.D. degree will **only** submit the **Program Proposal for a Master's Degree Form**. (See the Master's Degree Program Overview on page 7 for instructions).
- 2) Students admitted to the Ph.D. program with an M.S. degree, will submit the **PhD First Year Advising Form** to be signed by the student's advisor and submitted to the Student Service Office, Clark Center S-166.

### *Spring Quarter*

In spring quarter of the first year, the assigned advisor will again meet with the student to evaluate his or her progress. **The First-Year Evaluation Report** must be submitted to the Student Services Office by June 12th of the student's first year in the Ph.D. program. A faculty meeting is scheduled to review Graduate student progress.

## *PhD First Year Requirements*

### *Lab Rotations*

The department will not require formal lab rotations, but students will be encouraged to explore research activities in two or three labs during their first academic year. It is essential that students engage in intensive research in at least one laboratory during their first academic year.

### *Finding a Research Advisor*

Students must find a research or thesis advisor prior to the end of summer quarter. The research supervisor assumes primary responsibility for future direction of the student and will ultimately direct the student's dissertation. Most students find an advisor from among the primary faculty members of the bioengineering department. It is possible to perform your outside the bioengineering department if this provides the best research opportunity and if the outside advisor is an academic council member, is familiar with supervising bioengineering student and will provide funding for the work. Please notify the Student Service Office and your first-year advisor as soon as a research advisor is chosen.

### *Applying for Predoctoral Fellowship Applications*

All first-year Ph.D. students who are eligible to apply for outside predoctoral fellowships such as NSF, and NASA are strongly encouraged to do so. Applications for both are generally available in October and are due in November. Check with Student Services and Financial

Aid for further details and any questions concerning eligibility. Students are encouraged to consult with their faculty advisers when preparing fellowship applications.

### ***Teaching***

The Bioengineering Department believes that teaching is an important part of graduate level education in Bioengineering. Consequently, serving as a teaching assistant for two courses is a requirement for the Ph.D. in Bioengineering. Generally students serve as a teaching assistant for one course during each of the second and third years of graduate study. Students on full fellowship such as the NSF may hold a concurrent teaching assistantship up to a maximum of 25% with no additional hourly employment.

### ***Yearly Evaluations***

At the end of each academic year (usually in early June) the bioengineering faculty will evaluate the progress of all PhD students.

### ***Qualifying Exam Process***

Prior to being formally admitted to candidacy for the Ph.D. degree, each student must demonstrate knowledge of bioengineering fundamentals and potential for research by passing a qualifying oral examination. Potential for research is demonstrated by completing an outstanding bioengineering research project, testimony of the student's research advisor of their research potential, and the detailed evaluation as described below. Typically the exam is taken shortly after the student earns the masters degree and all students are required to take the PhD qualifying examination by the end of their 8<sup>th</sup> quarter at Stanford.

### ***Purpose of the Exam***

The PhD qualification exam has several goals.

- 1) To motivate students to review and synthesize course work and research material
- 2) To determine the student's ability to understand and apply fundamental concepts
- 3) To develop and test the student's ability to communicate orally and to respond to questions and comments
- 4) To evaluate the student's potential to pursue doctoral research
- 5) To identify areas that need to be strengthened for the student to be successful as a PhD student, independent scholar, and teacher.
- 6) To provide a mechanism for a range of faculty to come to know the student's capabilities

### ***Procedure for the Exam***

The procedure for the exam consists of six steps.

- 1) An Academic Council Faculty Member must be willing to supervise the student's PhD program and dissertation. The decision by the faculty member to supervise the student's program and dissertation is based on the potential of the student to become an independent scholar and is based on several factors. The most important factor is the

direct knowledge the faculty sponsor has obtained of the student's research capabilities (e.g., as acquired through supervising the student in a multi-quarter project course, independent study, or as Research Assistant). Other factors include the student's undergraduate and graduate course record, graduate record exam scores, and research, teaching and professional experience. The student must have a graduate Stanford GPA of 3.25 to be eligible for the exam. Students typically have a GPA of 3.50. Students are encouraged to take the exam during the academic year and to work together to prepare for the exam.

- 2) Once an Academic Council Faculty Member agrees to be the "faculty sponsor," (based on the student's demonstrated excellence in research) the student must submit an application folder containing the items listed below (a-f) to initiate the PhD Qualification Exam. The faculty sponsor will notify the department faculty that the application has been submitted and is on file for perusal by the faculty at the Student Services Office. Normally, the application will be discussed at the next faculty meeting (but no sooner than one week). The application should contain the following:
  - a) Updated transcripts of all undergraduate and graduate course work
  - b) Curriculum vitae
  - c) Calculation showing the student's GPA for courses taken at Stanford (Please exclude research and activity courses).  
<http://studentaffairs.stanford.edu/registrar/students/gpa-how>
  - d) Research project title and abstract (< 300 words). This abstract should be written by the student and represent research performed by the student. The abstract will describe the topic on which the student would lecture if asked (see below)
  - e) Preliminary dissertation proposal (< 3 pages). Knowledge and work of the student, and/or others, should be synthesized to present a rationale for the proposed dissertation topic (e.g., theory to be developed, hypotheses to be tested) as well as proposed methodology to fulfill the dissertation objective.
  - f) A list of four independent areas in which the student feels he/she has depth. One of these areas must come from a fundamental engineering topic (e.g., thermodynamics, fluid mechanics, control systems, signal processing, mathematics). A second area must be from a biological or medical specialty (e.g., molecular biology, cell biology, neurophysiology, cardiovascular medicine). The other two areas may come from any medical, biological, bioengineering, or other engineering topics that lead to a cohesive program of graduate study (e.g., genetics, developmental biology, biotechnology, neurology, medical imaging, computer graphics, mathematics, robotics, polymer physics). The student should discuss these areas with their advisor in the process of planning their graduate program and prior to preparation of their application folder.
- 3) The student, in absentia, will be evaluated by the faculty at one of the Bioengineering Department faculty meetings. The student's faculty sponsor must be present at the meeting and be willing to attest to the student's excellent research performance and their

potential for outstanding doctoral work. The evaluation will be based primarily on the student's research performance but also on interactions with faculty members during courses, teaching assistantships, and other academic activities. The faculty will determine if the student should be allowed to proceed to the next step in the PhD Qualifying Examination. If the student is not allowed to proceed, the faculty sponsor will convey to the student the reasons for the faculty's decision. Otherwise, the faculty will appoint a subcommittee consisting of three or four faculty, at least two of whom will be Academic Council Members of the Bioengineering Department.

- 4) The subcommittee is to obtain additional information regarding the student's potential to become an independent scholar. To accomplish this objective, the student will present to the subcommittee a technical lecture (< 15 minutes) on the topic contained in the abstract (see #2d). (One week prior to the lecture, the student will give each subcommittee member a "reminder" containing the short abstract of the lecture, and the time and place of the lecture.) This lecture, followed by a short question/answer session, will be open to all faculty and students. Afterwards, in a closed session (up to 1.5 hrs.) with the subcommittee, the student will answer additional questions regarding the topic presented at the lecture, the four areas chosen by the student (see #2f), the preliminary dissertation proposal (see #2e), or other related topics. (The two-hour time-slot and the place of the lecture and questioning will be arranged by the student and the faculty sponsor with consent of all subcommittee members.) The subcommittee will deliberate on all the information it has acquired (from the preliminary evaluation by all the faculty [see #3], and from the lecture and the question/answer session) and will decide on a recommendation of pass, conditional pass, or fail (see #5). This recommendation will be communicated to the student.
- 5) Possible outcomes are that the student:
  - a) Passes unconditionally;
  - b) Passes conditionally;  
In this case, the faculty will outline the weaknesses and how the conditions the student could (or must) fulfill before reconsideration (e.g., specific courses must be taken with performance at a specified level; communication skills need to be improved as evidenced by ...). With the faculty sponsors' endorsement, the student will later request a change from "conditional pass" to "pass" after he/she believes that the conditions have been fulfilled. The student will outline in this request the reasons for this belief. The faculty will meet again to act on the request.
  - c) Fails, with or without option to retake.
- 6) The student's sponsor will notify the student and the Student Services Office of the results of the examination.

## ***University PhD Requirements***

### ***Reading Committee***

Each Ph.D. candidate is required to establish a reading committee for the doctoral dissertation within six months after passing the department's Ph.D. Qualifying exams. Thereafter, the student should consult frequently with all members of the committee about the direction and progress of the dissertation research.

Students must have at least three faculty members: the principal dissertation advisor and two other readers serve on their Doctoral Dissertation Reading Committee who read and certify their dissertation. At least two members must be on the Stanford Academic Council. It is expected that at least one member of the Bioengineering faculty be on each reading committee.

[The Doctoral Dissertation Reading Committee Form](#) is to be completed and filed with the Student Service Office *before* scheduling a University oral examination that is a defense of the dissertation. On occasion, the department chair, may in some cases, approve the appointment of a reader who is not on the Academic Council, if that person is particularly well-qualified to consult on the dissertation topic and holds a Ph.D. or equivalent foreign degree. Approval is requested on a [Petition for Doctoral Committee Form](#).

### ***PhD Candidacy***

Students must be admitted to candidacy by the 6<sup>th</sup> quarter of the student's post-master's registration. Being admitted to candidacy signifies that the department considers the student capable of completing the requirements necessary for earning a Ph.D. degree. Candidacy is valid for five calendar years (through the end of the quarter in which candidacy expires), unless terminated by the department for unsatisfactory progress. An extension of candidacy may be obtained for a maximum of one additional year. In order to receive candidacy status, the student must file the [PhD candidacy form](#) to the Student Service Office. This form is to be approved and signed by the advisor, reading committee and the Associate Chair of Graduate Curriculum, Scott Delp.

### ***Terminal Graduate Registration (TGR)***

TGR status is reached when Ph.D. students have been admitted to candidacy, completed 135 units of coursework, and submitted the Doctoral Dissertation Reading Committee form. Student Services will contact students when they are approaching TGR eligibility. Students must complete the following paperwork and submit it to the Student Service Office *before the beginning of the quarter* in which they first become eligible for TGR status:

- a) [Request for TGR Status](#)

Students should then register for TGR Dissertation, **BIOE 802 (TGR Dissertation for zero units) each quarter** through AXESS. TGR Grading is as follows: "S" for satisfactory progress, "N-" for unsatisfactory progress, and "P" for a final grade when everything has been finished. A hold on registration is placed for a student who receives an "N-" grade for more than two consecutive quarters.

Students register at a special tuition rate, \$2775/qtr in 2013-2014. As course work is no longer considered necessary during this advanced stage of study, units are no longer counted towards residency. Within certain restrictions and after tuition adjustment to the appropriate unit rate, TGR students may enroll in additional courses at their own expense. This year the TGR tuition rate will cover 3 units of tuition.

### ***University Oral and Dissertation***

The Ph.D. candidate is required to take the University oral examination after the dissertation is substantially completed (with the dissertation draft in writing), but before final approval. The examination consists of a public presentation of dissertation research, followed by substantive private questioning on the dissertation and related fields by the University oral committee (four selected faculty members, plus a chair from another department). Once the oral has been passed, the student finalizes the dissertation for reading committee review and final approval. Forms for the [University oral scheduling](#) and a one-page dissertation abstract should be submitted to the department student services office at least three weeks prior to the date of the oral for departmental review and approval.

Please consult with the [Registrar's Dissertation and Thesis Submission](#) page for the most current specifications for formatting of dissertations and procedures for completing and delivering dissertations. It is the student's responsibility to obtain all required signatures on all forms and on the dissertation. The Registrar's Office in conjunction with the Stanford University Library is offering students the option to submit their dissertation/thesis in electronic format. The electronic submission process is free of charge to students and allows students the ability to log into Axess and check their pre-submission requirements in the eDissertation/eThesis Center under the academics tab. Once these requirements have been met the "Proceed to Dissertation/Thesis Submission page" button will open up in the student eDissertation/eThesis center and this will allow the student proceed and upload a soft copy of their dissertation/thesis. Students are responsible for purchasing bound copies for personal use.

### ***Graduation Quarter***

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

All course work, degree requirements, and residency requirements have been completed; Graduate students must have enrolled in the applicable 801 or 802 section relevant to their degree during the Graduation Quarter.

1. The student has formally applied to graduate via Axess.
2. The student has filed all necessary forms regarding Graduation Quarter before the first day of the term chosen as the Graduation Quarter.

3. A graduate student must have an active program status, which may include an approved leave of absence, in the term immediately preceding the term chosen as the Graduation Quarter (not applicable for undergraduates).
4. A graduate must have passed the oral examinations and successfully defended the dissertation/thesis. The graduate student has only to submit the dissertation/project or Master's thesis by the deadline for submission in the term designated as the Graduation Quarter (not applicable for undergraduates).

Students on Graduation Quarter are registered at Stanford and, therefore, have the rights and privileges of registered students. There is a registration fee of \$100 for the Graduation Quarter; students will be assessed University health insurance (unless waived) and ASSU fees. Only **one** Graduation Quarter may be requested for each degree program. Students who, for whatever reason, are not graduated during the Graduation Quarter will be assessed a higher, standard tuition rate in subsequent terms. Requests should be directed to the Student Service Office.

### *Commencement*

Commencement is held once a year in June. There are two ceremonies. The first one is the University ceremony (main event) and the department ceremony (diploma distribution) follows. Information about commencement is typically available around mid to late April.

### *Personal Leave for Graduate Students*

If a break in continuous formal study is needed, graduate students must request a leave of absence from the department Chair. The maximum period of leave granted is one year. The Leave of Absence petition should explain the request and include a proposed schedule for completion of the Ph.D. degree, taking into account the requested leave period. A letter of support from the major adviser and the official University Leave of Absence form should also be submitted to the department Chair.

If the student is not able to resume studies by the quarter originally approved by the department Chair, a one-time extension may be granted. If she or he wishes to return after an approved leave of absence has expired, the student must apply for reinstatement. Financial support from the department cannot be guaranteed in the event of an extended leave of absence.

### *Honor Code*

Stanford examinations are not proctored. This is not the tradition at many other universities. We do deal firmly with honor code violations. Students have been suspended, and have had degree conferral delayed, following convictions for honor code violations. Please read the [Stanford University Honor Code](#).

**Bioengineering Faculty Directory**  
(The Prefix for all Campus Numbers is 72)

<u>Professors</u>	<u>Email</u>	<u>Research</u>	<u>Phone/Location</u>
Russ Altman Professor	Russ.Altman@stanford.edu	Biomedical Computation	5-3394, Clark S242
Kwabena Boahen Associate Professor	boahen@stanford.edu	Neural Systems in Silicon	4-5633, Clark W125
Zev Bryant Assistant Professor	zevry@stanford.edu	Molecular Biophysics	4-3090, Clark E302
David Camarillo Assistant Professor	dcamarillo@stanford.edu	Smart Biomedical Devices	5-2590 Bldg. 540 Rm. 128
Dennis Carter Professor	dcarter@stanford.edu	Skeletal Mechanobiology	3-4784, Durand 215
Jennifer Cochran Associate Professor	cochran1@stanford.edu	Cell and Molecular Engineering	4-7808, Clark W250
Markus Covert Assistant Professor	mcovert@stanford.edu	Systems Biology	5-6615, Clark W153
Karl Deisseroth Professor	deissero@stanford.edu	Neuroscience	6-4325, Clark W083
Scott Delp Professor	delp@stanford.edu	Neuromuscular Biomechanics	5-4009, Clark S321
Drew Endy Assistant Professor	endy@stanford.edu	Synthetic Biology	3-7027, Y2E2 269B
KC Huang Assistant Professor	kchuang@stanford.edu	Cell and Molecular Engineering	1-2483, Clark S325
Jin Hyung Lee Assistant Professor	ljinhy@stanford.edu	Neurology and Neurological Sciences	6-2069, 1201 Welch Road, #P206



Michael Lin Assistant Professor	mzlin@stanford.edu	Human Gene Therapy	1-1681, CCSR 2105
Jan Liphardt Associate Professor	jliphard@stanford.edu	Biophysics	6-8483, Clark W121
Norbert Pelc Chair, Professor	pelc@stanford.edu	Biomedical Imaging	3-0435, Clark S172
Manu Prakash Assistant Professor	manup@stanford.edu	Physical Biology	5-3731, Clark E350B
Stephen Quake Professor	quake@stanford.edu	Biophysics	4-8891, Clark E300
Ingmar Riedel-Kruse Assistant Professor	riedel-kruse@stanford.edu	Physics of Development	3-2380, Clark E350
Matthew Scott Professor	mscott@stanford.edu	Genetic Regulation in Development and Disease	5-7680, Clark W200
Christina Smolke Associate Professor	csmolke@stanford.edu	Synthetic Biology	1-6371, Y2E2 269A
James Swartz Professor	jswartz@stanford.edu	Cell and Molecular Engineering	3-5398, Keck 185
Fan Yang Assistant Professor	fanyan@stanford.edu	Stem Cell and Biomaterials	5-7128; Edwards R152
Paul Yock Professor	yock@stanford.edu	Biomedical Devices	6-1160, Clark E100

## ***Bioengineering Administration***

Raul Felipa, Director of Finance and Administration	<a href="mailto:felipa@stanford.edu">felipa@stanford.edu</a>
Jocelyn Hollings, Grants Manager	<a href="mailto:jocelyn.hollings@stanford.edu">jocelyn.hollings@stanford.edu</a>
Patrick More, Grants Manager	<a href="mailto:pamore@stanford.edu">pamore@stanford.edu</a>
Michelle Phan, Grants Manager	<a href="mailto:phanmt@stanford.edu">phanmt@stanford.edu</a>
Olgalydia Winegar, Student Services Manager	<a href="mailto:owinegar@stanford.edu">owinegar@stanford.edu</a>
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### ***Facilities***

Bioengineering is jointly supported by the School of Engineering and the School of Medicine. The facilities and personnel of the Department of Bioengineering are housed in the James H. Clark Center, the William F. Durand Building for Space Engineering and Science, the William M. Keck Science Building, the Jerry Yang and Akiko Yamazaki Environment and Energy Building, and the Richard M. Lucas Center for Magnetic Resonance Spectroscopy and Imaging.

### ***Responsibility of Living in Clark***

- Bike Parking is on the east and west side of the building. Please do not park bikes in the courtyard, or along the handrails, as this creates a hazard.
- The seminar rooms and auditorium are available for general use, but must be reserved ahead of time through the online reservation system. Please contact Olgalydia Winegar, Student Services Manager for assistance. Conference rooms located on each floor are available to Clark residents only.
- Requests for IT support are made directly online at <https://helpsu.stanford.edu>. When submitting your help ticket, select "Clark Center" for the department in the drop down box on the web form. You may also phone 650-725-HELP and mention Clark Center to the consultant.

### ***Staying Connected***

Never hesitate to call security. They are here to help you feel safe and be secure in your work place. If you see something suspicious, if you are in harm's way, or if you are alone here at night and want an escort to your car, please call them. Security: 723-7222

Everyone working in Clark should subscribe to the Clark Center e-mail distribution list. This is the Clark center's primary means of disseminating information to all occupants of the building. See this link to subscribe to the list:

[https://mailman.stanford.edu/mailman/listinfo/clark\\_center](https://mailman.stanford.edu/mailman/listinfo/clark_center)

Student email lists are as follows:

[bioengphd@lists.stanford.edu](mailto:bioengphd@lists.stanford.edu) (PhD students)

[bioengmasters@lists.stanford.edu](mailto:bioengmasters@lists.stanford.edu) (MS students)

[bioecoterm@lists.stanford.edu](mailto:bioecoterm@lists.stanford.edu) (Coterm students)

[bioesocial@lists.stanford.edu](mailto:bioesocial@lists.stanford.edu) (Everyone)

### *Student Lounges*

The bioengineering student lounge, located next to the Student Service Office is a great place to take a break. The Clark building is wireless so you can take your computer anywhere. NeXus restaurant is open until 7:00pm. Feel free to gather there before or after lunch time. The most obvious places are Peet's Coffee (on the third floor) and the many tables and chairs scattered throughout the exterior terraces, and the courtyard. In case you are looking for a calming walk, Clark has close to one mile of exterior walkways with fabulous views.

### *Mail*

Graduate students will have shared mailboxes located in the Student Service Office in Clark Center S-166. Please check your mail periodically.

### *Student Organizations*

#### [Stanford Student Biodesign \(SSB\)](#)

This group aims to prepare students for careers in biotech, biomedical technology, bioengineering, and other fields at the intersection of life sciences and engineering. They offer career seminars, lectures, dinners with industry and faculty, community service opportunities, and hands-on innovation experience.

#### [SBSA](#)

Stanford Biosciences Student Association (SBSA) provides useful career resources and information, arranges fun social events, and imparts a political voice to the approximately 600 students enrolled in biological science graduate programs in 14 research departments here at Stanford University.

#### [BMES](#)

The purpose of the Stanford Biomedical Engineering Society (BMES) chapter is to promote and enhance biomedical engineering knowledge among undergraduate and graduate students at Stanford University. It accomplishes this by connecting existing student groups, establishing mentorships, and performing community outreach.

## *Places to Get Help*

Problems and conflicts can arise over the course of your graduate career. If you are having a conflict, let the other person know as they might be unaware of the situation. However, realize that you are not alone in the process. Here is just a sample of individual/offices that you can turn to. They are not listed in any particular order, so feel free to chat with whomever you feel most comfortable with.

[CAPS-Counseling Services](#) (completely confidential) 723-3785

[Bridge Peer Counseling Center](#), (completely confidential) 723-3392

[Olgalydia Winegar](#), Student Services Manager

## *Campus Computer Resources*

There are a numerous facilities and options for computer resources at Stanford. Most students have their own computers, but there are many places on campus for non-owners to use computers.

### **Meyer Computer Cluster/Multimedia Studio** 723-9407

The second floor of Meyer Library is home to a state-of-the-art multimedia production facility available to anyone with an e-mail account. It includes digital-film video workstations, video editing stations, flat bed and 35mm slide scanners, MIDI keyboards, and removable media disc drives. Meyer also possesses a large bank of PCs and Macs. Connection stations in the cluster allow you to hook your laptop into SUNet.

### **Tresidder LAIR Computer Cluster** 723-1315

The LAIR on the second floor of Tresidder offers a self-serve cluster of PCs and Macs that are accessible 24 hours a day!

[The UNIX Computer Resources](#) provides UNIX facilities for general and research computing to anyone with a full-service [SUNet ID](#). The computers are housed in a [remote computing facility](#) run by Information Technology Services. Additional resources may be available to students or faculty affiliated with a specific department.

### **Residential Computer Consultants (on-campus housing)**

If you live on campus and have a personal computer, you can hook up to the network from your room. Ask you Residential Computer Consultant (RCC) for more details about PhoneNet and Ethernet connections or visit their web site at <http://rescomp.stanford.edu>. Each residence hall also has its own computer cluster.

### **Computer Department** (at the Stanford bookstore)

When purchasing a computer or software, try the Computer Department in the main campus Stanford bookstore. The Computer Department offers educational discounts on personal computers, peripherals and software. They have a demonstration area where you can try the merchandise and an on-site service center.

