

SUSTAINABILITY SCIENCE AND PRACTICE

Courses offered by the Sustainability Science and Practice program are listed under the subject code SUST on the Stanford Bulletin's ExploreCourses (<https://explorecourses.stanford.edu>) website.

Mission of the Coterminal Program in Sustainability Science and Practice.

The Sustainability Science and Practice program is an interdisciplinary program hosted by the School of Earth, Energy and Environmental Sciences (<http://exploreddegrees.stanford.edu/schoolofearthsciences>). As the global human population climbs toward 11 billion this century and consumption demands increase, we must find ways to meet the needs of people in ways that do not forgo possibilities for future generations. These sustainability challenges are marked by extreme complexity, urgency, conflicting demands, and often a paucity of resources or political will to address them.

The program integrates theoretical and conceptual knowledge with practical skills and tools to prepare students to both envision a prosperous future for all, and know how to design the practices and cultivate partnerships essential to building that future.

The curriculum covers three main elements:

Understanding complex social-environmental systems

Students explore tools to measure, map, and model five capital assets – social, natural, human, manufactured, and knowledge capital – and their complex interactions in order to recognize potential feedbacks, thresholds, and unintended interactions and outcomes, as well as to identify leverage points and opportunities for interventions that can have transformative impact.

Understanding decision making and developing strategies for change

Students examine the roles of diverse actors who influence change in social-environmental systems and explore strategies to align decision making and behavior with sustainability goals. They explore mindsets and attributes of transformative leaders and their organizations while building a range of skills, including decision making, the use of inclusive metrics and evaluation approaches, and communication approaches.

Designing innovations with impact at scale

Students learn a framework and methods of practice for innovation in the context of complex and systemic challenges, including systems thinking, social cognitive theory, behavioral economics, technology strategy, business model innovation, and system based theories of change, in order to generate creative interventions to bring about change.

In addition, students complete a 4 unit (120 hour) practicum placement which provides a hands-on experience working with a partner organization on a real-life challenge.

Learning Outcomes

The Sustainability Science and Practice program integrates theoretical and conceptual knowledge, mindsets and practical skills and tools to enable students to understand and manage complex systems, understand decision making and develop strategies for change, and develop partnerships and design innovations with potential for large scale impact.

The program prepares students to become effective participants and agents of change as individuals and within organizations across all sectors of society, contributing to the advancement of the goal of sustainability, i.e., the well-being of people around the world and across generations. Using a conceptual framework that connects human well-being with key underlying assets, students learn how social-environmental systems work, how decisions are and can be made to influence system dynamics in a way that supports sustainability goals, and how to engage with others to design new ways of managing these systems.

Coterminal Master's Degrees in Sustainability Science and Practice

The Sustainability Science and Practice program offers current Stanford University undergraduates the opportunity to apply to a one-year coterminal master's program. Sustainability Science and Practice offers both a coterminal Master of Arts (M.A.) and a coterminal Master of Science (M.S.) degree.

Application and Admission

Sustainability Science and Practice accepts applications in the Autumn, Winter, and Spring quarters. Application deadline is 11.59pm on the seventh Monday of the quarter. If the seventh Monday is an official University holiday, applications are due by 11.59pm on the seventh Tuesday of the quarter. Seniors intending to confer their degrees at the end of the Spring Quarter must apply by Winter Quarter deadline.

To apply, students should submit an online application. The application includes the following:

- The online Stanford coterminal application (<https://www.applyweb.com/stanterm>)
- A statement of purpose
- A resume
- A current Stanford unofficial transcript
- Two letters of recommendation, one of which must be from the master's advisor (who must be an Academic Council member)
- Master's program proposal (link): a list of proposed courses that fulfill degree requirements, signed by the master's adviser.

Applications must be submitted no later than the quarter prior to the expected completion of the bachelor's degree (and within quarterly application deadlines). An application fee is assessed by the Registrar's Office for coterminal applications once students are matriculated into the program.

Students applying to the coterminal master's program must have completed a minimum of 120 units towards graduation with a minimum overall Stanford GPA of 3.4.

All applicants must devise a program of study that shows a level of courses appropriate to the master's level, as determined in consultation with the masters advisor and the Director of Sustainability Science and Practice.

The student has the option of receiving the bachelor's degree after completing the degree's requirements, or receiving the bachelors and masters degrees concurrently at the completion of the master's program.

Students must submit a new application to change from the M.S to the M.A. in Sustainability Science and Practice, or from the M.A. to the M.S. in Sustainability Science and Practice. If accepted, the student must submit a Graduate Authorization Petition through Axxess; a \$125 fee applies to a successful Graduate Authorization Petition.

University Coterminal Requirements

Coterminal master's degree candidates are expected to complete all master's degree requirements as described in this bulletin. University requirements for the coterminal master's degree are described in the "Coterminal Master's Program (<http://exploreddegrees.stanford.edu/cotermdegrees>)" section. University requirements for the master's degree are described in the "Graduate Degrees (<http://exploreddegrees.stanford.edu/graduatedegrees/#masterstext>)" section of this bulletin.

After accepting admission to this coterminal master's degree program, students may request transfer of courses from the undergraduate to the graduate career to satisfy requirements for the master's degree. Transfer of courses to the graduate career requires review and approval of both the undergraduate and graduate programs on a case by case basis.

In this master's program, courses taken during or after the first quarter of the sophomore year are eligible for consideration for transfer to the graduate career; the timing of the first graduate quarter is not a factor. No courses taken prior to the first quarter of the sophomore year may be used to meet master's degree requirements.

Course transfers are not possible after the bachelor's degree has been conferred.

The University requires that the graduate adviser be assigned in the student's first graduate quarter even though the undergraduate career may still be open. The University also requires that the Master's Degree Program Proposal be completed by the student and approved by the department by the end of the student's first graduate quarter.

Master of Arts in Sustainability Science and Practice Degree Requirements

The following are required of all M.A. students:

- A minimum of 45 units of course work.
- At least 34 units of the student's course work for the master's program must be at the 200 level or above.
- All remaining course work must be at the 100 level or above.
- All courses for the master's program must be taken for a letter grade; courses not taken for a letter grade must be approved by the master's adviser and the Director of Sustainability Science and Practice.
- A minimum overall GPA of 3.4 must be maintained.
- 25 or more of the 45 units must be designated as arts units. Course coding can be seen in the master list of courses, available here.

For the Master of Arts in Sustainability Science and Practice, an ethics course must be taken if not completed in the undergraduate degree program. This course does not have to be completed before applying to the coterm program. It can be taken as an elective.

Required Courses

Ethics

Select one of the following:

		Units
ETHICSOC 234R	Ethics on the Edge: Business, Non-Profit Organizations, Government, and Individuals	3
PHIL 277C	Ethics of Climate Change	4

or approved alternative

The following courses are required for the Master of Arts in Sustainability Science and Practice. If required courses have been taken in the undergraduate career, students pursue additional electives.

		Units
SUST 210	Pursuing Sustainability: Managing Complex Social Environmental Systems	3
SUST 220	Case Studies in Leading Change for Sustainability	3
SUST 230	Innovating Large Scale Sustainable Transformations	4
SUST 240	Sustainability Science and Practice Practicum	1-4
EARTHSYS 111/211	Biology and Global Change ¹	4
EARTHSYS 112/212	Human Society and Environmental Change ¹	4
Minimum 1, Maximum 2 of the following		3-8
SUST 231	EARTHSYS 289/EEED Lab: Food System Design & Innovation	
ME 206A & ME 206B	Design for Extreme Affordability and Design for Extreme Affordability ²	
ME 313	Human Values and Innovation in Design	
ME 377	Design Thinking Studio: Experiences in Innovation and Design	
Minimum 1, Maximum 2 of the following		3-6
PSYCH 215	Mind, Culture, and Society	
PSYCH 216	Public Policy and Social Psychology: Implications and Applications	
PSYCH 265	Social Psychology and Social Change	
One of the following		3-4
LAW 7508	Problem Solving and Decision Making for Public Policy and Social Change	
GSBGEN 367	Problem Solving for Social Change	

¹ Students who took the undergraduate offering of this course may count it towards the degree. Students who did not take the undergraduate offering must enroll in the graduate (200-level) offering.

² These courses count as two courses towards this requirement.

A current list of electives can be found on the program's spreadsheet (<https://stanford.box.com/v/sust-courses>).

Master of Science in Sustainability Science and Practice Degree requirements

The following are required of all M.A. students:

- A minimum of 45 units of course work.
- At least 34 units of the student's course work for the masters program must be at the 200 level or above.
- All remaining coursework must be at the 100 level or above.
- All courses for the master's program must be taken for a letter grade; courses not taken for a letter grade must be approved by the master's adviser and Director of Sustainability Science and Practice.
- A minimum overall GPA of 3.4 must be maintained.
- Twenty five or more of the 45 units must be designated as 'science' units. Course coding can be seen in the master list of courses, available here.
- For the Master of Arts in Sustainability Science and Practice, the following courses must be taken if not completed in the undergraduate degree program. These courses do not have to be completed before applying to the coterm program. The ethics course can be taken as an elective. The Math and Stats courses may not be counted as part of the 45-unit masters degree.

Ethics

Select one of the following:

ETHICSOC 234R	Ethics on the Edge: Business, Non-Profit Organizations, Government, and Individuals	3
PHIL 277C	Ethics of Climate Change	4

or approved alternative

Mathematics

Select one of the following:

MATH 51	Linear Algebra and Differential Calculus of Several Variables	5
CME 100	Vector Calculus for Engineers	5

Statistics

Select one of the following:

ECON 102A	Introduction to Statistical Methods (Postcalculus) for Social Scientists	5
STATS 110	Statistical Methods in Engineering and the Physical Sciences	4-5
STATS 116	Theory of Probability	3-5

Required Courses

The following courses are required for the Master of Arts in Sustainability Science and Practice. If required courses have been taken in the undergraduate career, students pursue additional electives.

SUST 210	Pursuing Sustainability: Managing Complex Social Environmental Systems	3
SUST 220	Case Studies in Leading Change for Sustainability	3
SUST 230	Innovating Large Scale Sustainable Transformations	4
SUST 240	Sustainability Science and Practice Practicum	1-4
EARTHSYS 111/211	Biology and Global Change ¹	4
EARTHSYS 112/212	Human Society and Environmental Change ¹	4
Minimum 1, Maximum 2 of the following		3-8
SUST 231		
EARTHSYS 289	FEED Lab: Food System Design & Innovation	
ME 206A & ME 206B	Design for Extreme Affordability and Design for Extreme Affordability ²	
ME 313	Human Values and Innovation in Design	
ME 377	Design Thinking Studio: Experiences in Innovation and Design	
Mimumum 1, Maximum 2 of the following		3-6
PSYCH 215	Mind, Culture, and Society	
PSYCH 216	Public Policy and Social Psychology: Implications and Applications	
PSYCH 265	Social Psychology and Social Change	
One of the following		3-4
LAW 7508	Problem Solving and Decision Making for Public Policy and Social Change	
GSBGEN 367	Problem Solving for Social Change	

A current list of electives can be found on the program's spreadsheet (<https://stanford.box.com/v/sust-courses>).

Units Director: Pamela Matson

Associate Director: Julia Novy-Hildesley

Affiliated Faculty and Lecturers:

- Kevin Arrigo (Donald & Donald M. Steel Professor in Earth Sciences; Victoria and Roger Sant Director, Earth Systems Program)
- Nicole M. Ardoin (Associate Professor of Education and Senior Fellow at the Woods Institute for the Environment)
- Shilajeet Banerjee (Professor of Practice, Emmett Interdisciplinary Program in Environment and Resources)
- William Barnett (Thomas M. Siebel Professor In Business Leadership, Strategy, & Organizations)
- Sally Benson (Director, Precourt Institute for Energy and Professor of Energy Resources Engineering and Senior Fellow at The Precourt Institute For Energy)
- Paul Brest (University Faculty Law Teaching Professor Emeritus)
- Marshall Burke (Assistant Professor of Earth System Science and Center Fellow at the Freeman Spogli Institute for International Studies and, by courtesy, at the Woods Institute for the Environment)
- Gretchen C. Daily (Bing Professor in Environmental Science and Senior Fellow the Woods Institute for the Environment)
- Jenna Davis (Associate Professor of Civil and Environmental Engineering and Senior Fellow the Woods Institute for the Environment)
- Rob Dunbar (W.M. Keck Professor in the School of Earth, Energy & Environmental Sciences and Senior Fellow, by courtesy, at the Woods Institute for the Environment)
- Zephyr Frank (Professor of History and, by courtesy, Iberian and Latin American Cultures)
- Pamela Hinds (Professor of Management Science and Engineering)
- Rob Jackson (Michelle and Kevin Douglas Provostial Professor and Senior Fellow at the Woods Institute for the Environment and at The Precourt Institute for Energy)
- James Holland Jones (Associate Professor of Earth System Science and Senior Fellow at the Woods Institute for the Environment)
- Jeffrey R. Koseff (William Alden Campbell and Martha Campbell Professor in the School of Engineering and Senior Fellow at the Woods Institute for the Environment)
- Eric Lambin(George and Setsuko Ishiyama Provostial Professor and Senior Fellow at the Woods Institute for the Environment)
- Hazel Markus (Davis-Brack Professor in the Behavioral Sciences)
- Pamela Matson (Chester Naramore Dean of the School of Earth, Energy & Environmental Sciences, Richard and Rhoda Goldman Professor in Environmental Studies and Senior Fellow at the Woods Institute)
- Rosamond Naylor (William Wrigley Professor, Senior Fellow at the Woods Institute for the Environment and at the Freeman Spogli Institute for International Studies and Professor, by courtesy, of Economics)
- Julia Novy-Hildesley (Professor of the Practice, Emmett Interdisciplinary Program in Environment and Resources)
- Burke Robinson (Lecturer, Management Science and Engineering)
- Jenny Suckale (Assistant Professor of Geophysics and, by courtesy, of Civil and Environmental Engineering)
- Barton Thompson (Robert E. Paradise Professor in Natural Resources Law and Senior Fellow at the Woods Institute for the Environment)
- Peter Vitousek (Clifford G. Morrison Professor in Population and Resource Studies, Senior Fellow at the Woods Institute for the Environment and Professor, by courtesy, of Earth System Science)

- Jeremy Weinstein (Professor of Political Science and Senior Fellow at The Freeman Spogli Institute for International Studies)
- Mikael Wolfe (Assistant Professor of History)