Environmental Earth System Science


Environmental Earth System Science studies the planet’s oceans, lands, and atmosphere as an integrated system, with an emphasis on changes occurring during the current period of overwhelming human influence, the Anthropocene. Faculty and students within the department use the principles of biology, chemistry, and physics to study problems involving processes occurring at the Earth’s surface, such as climate change and global nutrient cycles, providing a foundation for problem solving related to environmental sustainability and global environmental change.

Graduate Programs in Environmental Earth System Science

The University’s basic requirements for the M.S. and Ph.D. degrees are discussed in the "Graduate Degrees (http://www.stanford.edu/dept/registrar/bulletin/4901.htm)" section of this bulletin.

Learning Objectives (Graduate)

The objectives of the doctoral program in Environmental Earth System Science are to enable students to develop the skills needed to conduct original investigations in environmental and earth system sciences, to interpret the results, and to present the data and conclusions in a publishable manner. Graduates should develop strong communication skills with the ability to teach and communicate effectively with the public.

The objectives of the master’s program in Environmental Earth System Science is to continue a student’s training in one of the earth science disciplines and to prepare students for a professional career or doctoral studies.

Master of Science in Environmental Earth System Science

The University’s requirements for M.S. degrees are outlined in the "Graduate Degrees (http://www.stanford.edu/dept/registrar/bulletin/4901.htm)" section of this bulletin. Additional departmental requirements include the following:

1. Completion of core course work:
2. 

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<th>Course</th>
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<th>Units</th>
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<tbody>
<tr>
<td>EESS 211</td>
<td>Fundamentals of Modeling</td>
<td>3-5</td>
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<td>EESS 212</td>
<td>Measurements in Earth Systems</td>
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3. Enrollment in EESS 301 Topics in Environmental Earth System Science, each quarter during the academic year.
4. A minimum of 45 units of course work at the 100 level or above.
5. Half of the courses used to satisfy the 45-unit requirement must be intended primarily for graduate students, usually at the 200 level or above.
6. No more than 15 units of thesis research may be used to satisfy the 45-unit requirement.
7. Some students may be required to make up background deficiencies in addition to these basic requirements.
8. By the end of Winter Quarter of the first year in residence, a student must complete at least three courses taught by a minimum of two different department faculty members.
9. Serve as a teaching assistant in at least two quarters during their graduate career.

The department’s graduate coordinator, in coordination with the departmental faculty, appoints an academic adviser prior to registration with appropriate consideration of the student’s background, interests, and professional goals. In consultation with the adviser, the student plans a program of course work for the first year. The faculty adviser is charged with designing the curriculum in consultation with the student specific to the research topic. Each student must complete a thesis describing his or her research. Thesis research should begin during the first year of study at Stanford and should be completed before the end of the second year of residence. Early during the thesis research period, and after consultation with the student, the thesis adviser appoints a second reader for the thesis who must be approved by the graduate coordinator; the thesis adviser is the first reader. The two readers jointly determine whether the thesis is acceptable for the M.S. degree in the department.

Master of Science, Course Work Only Option

The course-work-only M.S. for EESS Ph.D. students requires 45 unduplicated units of which all 45 must be course work (non-research, non-independent study, non-thesis units). All required units must be in courses at the 100-level or above, 50 percent of those units must be in graduate-level courses (generally, at the 200-level or above). No units are awarded for course work completed elsewhere (i.e., not eligible to transfer-in units). All 45 units can be applied to the 135 unit requirement for the Ph.D. The remaining 90 units can consist of all research units.

Doctor of Philosophy in Environmental Earth System Science

The University’s requirements for the Ph.D. degree are outlined in the "Graduate Degrees (http://www.stanford.edu/dept/registrar/bulletin/4901.htm)" section of this bulletin. A summary of additional department requirements follows:

1. Completion of core course work:
2. 

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<td>Earth System Dynamics</td>
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<tr>
<td>EARTHSCI 300</td>
<td>Earth Sciences Seminar</td>
<td>1</td>
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</table>
3. Enrollment in EESS 301 Topics in Environmental Earth System Science, each quarter during the academic year.

4. By the end of Winter Quarter of their first year in residence, students must complete at least three courses taught by a minimum of two different departmental faculty members.

5. Completion of required courses in their individual program or in their specialized area of study with a grade point average (GPA) of 3.0 (B) or higher, or demonstrate that they have completed the equivalents elsewhere.

6. Completion of a minimum of four letter grade courses of at least three units each from four different faculty members on the Academic Council in the University.

7. Serve as a teaching assistant in at least four quarters during their graduate career.

8. During Spring Quarter of each year, students must undergo an annual review by their thesis committee to allow the committee to monitor the progress of the student and make recommendations, where necessary.

9. Qualify for candidacy for the Ph.D. by the end of the sixth quarter in residence, excluding summers. Department procedures require selection of a faculty thesis adviser, preparation of a written research proposal, approval of this proposal by the thesis adviser, selection of a committee for the Ph.D. qualifying examination, and approval of the membership by the graduate coordinator and chair of the department. The research examination consists of three parts: oral presentation of a research proposal; examination on the research proposal; and examination on subject matter relevant to the proposed research. The exam should take place prior to May 1 so that its outcome is known at the time of the annual spring evaluation of graduate students.

Upon qualifying for Ph.D. candidacy, the student and thesis adviser, who must be a department faculty member, choose a research committee that includes a minimum of two faculty members in the University in addition to the adviser. Annually, in the month of March or April, the candidate must organize a meeting of the full research committee to present a progress report covering the past year and provide expected goals for the coming year.

Under the supervision of the research advisory committee, the candidate must prepare a doctoral dissertation that is a contribution to knowledge and is the result of independent research; curriculum must also be developed with the supervision of the committee, which should be designed to provide a rigorous foundation for the research area. The format of the dissertation must meet University guidelines. The student is urged to prepare dissertation chapters that, in scientific content and format, are readily publishable.

The doctoral dissertation is defended in the University oral examination. The department appoints the research adviser and two other members of the research committee to be readers of the draft dissertation. The readers are charged to read the draft and to certify in writing to the department that it is adequate to serve as a basis for the University oral examination. Upon obtaining this written certification, the student is permitted to schedule the University oral examination.

Co-Chairs: Scott Fendorf, Eric Lambin

Professors: Kevin Arrigo, C. Page Chamberlain, Robert Dunbar, Scott Fendorf, Christopher Field¹, Steven Gorelick, Julie Kennedy, Eric Lambin², Pamela Matson (Dean), Rosamond Naylor ² ⁴, Robert Jackson²

Associate Professors: Noah Diffenbaugh², Christopher Francis, David Lobel² ⁴

Assistant Professors: Karen Casciotti, Balakanapathy Rajaratnam³, Leif Thomas, Paula Welander

¹Joint appointment with Biology
²Joint appointment with Woods Institute for the Environment
³Joint appointment with Statistics
⁴Joint appointment with the Freeman Spogli Institute for International Studies

Courtesy Professors: Gregory Asner, Ken Caldeira, Anna Michalak, Peter Vitousek

Visiting Professors: Peter Frumhoff, Andreas Mulch, Dominik Weiss

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