Earth System Science, Ph.D.

The Earth, as a coupled system of atmosphere, ocean, land, and cryosphere, has changed in our lifetime. The observed depletion of stratospheric ozone at high latitudes has been attributed directly to industrial use of halocarbons. Global warming a result of increases in the atmospheric concentrations of greenhouse gases, such as carbon dioxide and methane, which are released by the use of fossil fuel and agricultural practices. These examples illustrate the ability of humans to alter the global environment. Understanding the sensitivity of the Earth’s climate system requires a broad base of scientific knowledge, which includes detection, quantification, and prediction of the rates of change of chemical, physical, and biological variables. Our program is built around this interdisciplinary and holistic approach to the Earth System.

The Department’s doctoral program is aimed at training new research scientists in the field of Earth System Science. The graduate education provides a comprehensive curriculum, along with opportunities to conduct groundbreaking research. The Department’s doctoral-level students are expected to become researchers with a global perspective and broad research skills as well as a high level of expertise in specific areas. Active programs of research are underway studying the influence of human activities in the Earth System, biogeochemistry, and physical climate.

NOTE: Students are admitted to the Ph.D. program only; the master’s degree is awarded upon progress to the Ph.D.

Course Requirements

Students must complete a minimum of nine 4-unit approved graduate-level courses, including the core curriculum, with an average grade of B or better. All courses must be approved by the student’s advisor.

A. Complete:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>EARTHSS 200</td>
<td>Global Physical Climatology</td>
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<tr>
<td>EARTHSS 204</td>
<td>Humans in the Earth System</td>
</tr>
<tr>
<td>EARTHSS 266</td>
<td>Global Biogeochemical Cycles</td>
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<tr>
<td>EARTHSS 298</td>
<td>Practicum in Earth System Science</td>
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B. Select at least five additional graduate-level courses, two of which must be offered by the Earth System Science Department.

Residency

Academic Senate regulations specify a minimum period of residence of six quarters for Ph.D. candidates. Enrollment in a minimum of 12 units of graduate/upper-division course work per quarter is required. Registration in every regular academic session is necessary until all requirements for the degree have been completed, unless a formal Leave of Absence is granted by the Graduate Division. All Ph.D. requirements must be completed within 15 quarters in residence (five years), excluding summer quarters. Exceptions must be put to a vote of the Earth System Science faculty. The maximum time permitted is seven years.

Comprehensive Examination

Progress toward the degree and readiness to begin research is assessed by a comprehensive examination covering breadth, general knowledge, and the ability to integrate and use information covered in the core curriculum and other course work. At the end of the spring quarter, the ESS Comprehensive Examination Committee administers the written and oral examinations.

Teaching and Seminar

Students are required to complete a teaching assistant training program and to have a minimum of two quarters of experience as a teaching assistant, provided opportunities are available. Students can enroll in EARTHSS 399 while serving as a teaching assistant. Students are also expected to participate in the Earth System Science seminar.

Advance to Ph.D. Candidacy

Following completion of the Comprehensive Examination, those students who receive a recommendation to continue Ph.D. work will pursue research on a potential dissertation topic and then take the Advancement to Candidacy Examination. This oral examination is given by a faculty committee, including extra-departmental faculty. The normative time for advancement for candidacy is two years.

Dissertation

After advancing to candidacy, students are expected to be fully involved in research toward writing their Ph.D. dissertation. Students should keep in steady contact/interaction with their Doctoral Committee. A dissertation based on original research and demonstrating critical judgment, intellectual synthesis, creativity, and clarity in written communication is required for the Ph.D. degree. The dissertation must summarize the results of original research performed by the student under the supervision of a faculty member of the Department. The dissertation will be evaluated by the Dissertation Committee, based on suitability for publication in a peer-reviewed journal of high editorial standards. The dissertation may be a compilation of published papers or manuscripts accepted for publication, so long as the candidate has produced a major proportion of the material independently. The Dissertation Committee approves the format and content, which must meet University requirements for style, format, and appearance.
Additional Requirements
1. Completion of course work (9 courses, including core courses)
2. Six quarters in residence at UCI
3. Completion of the Comprehensive Examination, with recommendation to continue for the Ph.D.
4. Completion of the teaching and seminar requirements
5. Pass the Advancement to Candidacy Examination
6. Presentation of an open research seminar
7. Submission of an acceptable doctoral dissertation and formal defense.