

Environmental Earth Science

Bachelor of Arts (BA)

The environmental earth science major is designed to provide students with a broad background in the earth sciences with an emphasis on environmental sciences. Interrelationships between physical, biological, and chemical processes at Earth's surface will be emphasized. The major focuses more broadly on the natural sciences by using earth science mainly as a base for expanding outward depending upon students' interests by incorporating courses in biology, hydrology, hazardous waste management, ecology and natural resources. The program is designed to provide background for graduate study in environmental science, preparation for work within governmental agencies such as the Environmental Protection Agency, Bureau of Land Management, United States Geological Survey or consulting firms, or broader involvement in land use planning, business, policy, law or management.

Declaring the Major

The department strongly encourages students to see the student services adviser as early as possible. Students are accepted into the major with a C average or better. There are a number of scholarships and research opportunities as well as other benefits available to declared majors.

Honors Program

Students in the honors program must fulfill the following additional requirements: (1) maintain a GPA of at least 3.3 in all courses in the major, and an overall GPA of at least 3.3 in the University; and (2) carry out an individual research or study project, involving at least 3 units of EPS H195. The project is chosen in consultation with a departmental adviser, and written report is judged by the student's research supervisor and a departmental adviser. Application for the honors program should be made through the student's adviser no later than the end of the student's junior year.

Minor Program

For information regarding the requirements, please see the Minor Requirements tab. Program planning and confirmation should be done with the undergraduate student services adviser and the environmental earth science faculty adviser.

Other Majors and Minors Offered by the Department of Earth and Planetary Science

Atmospheric Science (<http://guide.berkeley.edu/archive/2017-18/undergraduate/degree-programs/atmospheric-science>) (Major and Minor)
 Geology (<http://guide.berkeley.edu/archive/2017-18/undergraduate/degree-programs/geology>) (Major and Minor)
 Geophysics (<http://guide.berkeley.edu/archive/2017-18/undergraduate/degree-programs/geophysics>) (Major and Minor)
 Marine Science (<http://guide.berkeley.edu/archive/2017-18/undergraduate/degree-programs/marine-science>) (Major and Minor)
 Planetary Science (<http://guide.berkeley.edu/archive/2017-18/undergraduate/degree-programs/planetary-science>) (Major and Minor)

In addition to the University, campus, and college requirements, listed on the College Requirements tab, students must fulfill the below requirements specific to their major program.

General Guidelines

1. All courses taken to fulfill the major requirements below must be taken for graded credit, other than courses listed which are offered on a Pass/No Pass basis only. Other exceptions to this requirement are noted as applicable.
2. No more than one upper division course may be used to simultaneously fulfill requirements for a student's major and minor programs, with the exception of minors offered outside of the College of Letters & Science.
3. A minimum grade point average (GPA) of 2.0 must be maintained in both upper and lower division courses used to fulfill the major requirements.

For information regarding residence requirements and unit requirements, please see the College Requirements tab.

Lower Division Requirements

EPS 50	The Planet Earth	4
Select one of the following math sequences:		
MATH 16A & MATH 16B	Analytic Geometry and Calculus and Analytic Geometry and Calculus	
MATH 1A & MATH 1B	Calculus and Calculus	
MATH 10A & MATH 10B	Methods of Mathematics: Calculus, Statistics, and Combinatorics and Methods of Mathematics: Calculus, Statistics, and Combinatorics	
CHEM 1A & 1AL or CHEM 4A	General Chemistry and General Chemistry Laboratory General Chemistry and Quantitative Analysis	4
BIOLOGY 1B	General Biology Lecture and Laboratory	4
Select one of the following physics sequences:		
PHYSICS 5A & PHYSICS 5B	Introductory Mechanics and Relativity and Introductory Electromagnetism, Waves, and Optics	
PHYSICS 8A & PHYSICS 8B	Introductory Physics and Introductory Physics	
PHYSICS 7A & PHYSICS 7B	Physics for Scientists and Engineers and Physics for Scientists and Engineers	

Upper Division Requirements

EPS 102	History and Evolution of Planet Earth	4
EPS 117	Geomorphology	4
EPS 150	Case Studies in Earth Systems ¹	2
ENE,RES 102	Quantitative Aspects of Global Environmental Problems	4
Electives, select 12 upper division units from the following list of suggested courses: ²		12
EPS 100A	Minerals: Their Constitution and Origin	
EPS 100B	Genesis and Interpretation of Rocks	
EPS C100	Communicating Ocean Science	
EPS 103/203	Introduction to Aquatic and Marine Geochemistry	

EPS 109	Computer Simulations in Earth and Planetary Sciences
EPS 115	Stratigraphy and Earth History
EPS 122	Physics of the Earth and Planetary Interiors
EPS 125	Stable Isotope Geochemistry
EPS 131	Geochemistry
EPS C146	Geological Oceanography
EPS C178	Applied Geophysics
EPS C180	Air Pollution
EPS C181	Atmospheric Physics and Dynamics
ESPM 120	Soil Characteristics
ESPM C128	Chemistry of Soils
GEOG C136	Terrestrial Hydrology
CIV ENG 115	Water Chemistry
GEOG 140A	Physical Landscapes: Process and Form
GEOG 142	Climate Dynamics
GEOG 143	Global Change Biogeochemistry
GEOG 144	Principles of Meteorology
INTEGBI 113L	Paleobiological Perspectives on Ecology and Evolution
INTEGBI 152	Environmental Toxicology
INTEGBI 153	Ecology
INTEGBI C155	Holocene Paleocology: How Humans Changed the Earth
INTEGBI 160	Evolution
INTEGBI 184L	Morphology of the Vertebrate Skeleton with Laboratory

- ¹ This course can only be taken during the student's senior year.
- ² All elective courses used to fulfill the major requirements must be approved by the faculty adviser. This list is intended as a guide; the suggested courses are not limited to only courses included in this list.

Students who have a strong interest in an area of study outside their major often decide to complete a minor program. These programs have set requirements and are noted officially on the transcript in the memoranda section, but they are not noted on diplomas.

General Guidelines

1. All courses taken to fulfill the minor requirements below must be taken for graded credit.
2. A minimum of three of the upper division courses taken to fulfill the minor requirements must be completed at UC Berkeley.
3. A minimum grade point average (GPA) of 2.0 is required for courses used to fulfill the minor requirements.
4. Courses used to fulfill the minor requirements may be applied toward the Seven-Course Breadth requirement, for Letters & Science students.
5. No more than one upper division course may be used to simultaneously fulfill requirements for a student's major and minor programs.
6. All minor requirements must be completed prior to the last day of finals during the semester in which you plan to graduate. If you cannot finish all courses required for the minor by that time, please see a College of Letters & Science adviser.

7. All minor requirements must be completed within the unit ceiling. (For further information regarding the unit ceiling, please see the College Requirements tab.)

Requirements

Lower Division

EPS 50	The Planet Earth (or equivalent)	4
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Upper Division

Select a minimum of five of the following:

EPS 100A	Minerals: Their Constitution and Origin
EPS 100B	Genesis and Interpretation of Rocks
EPS C100	Communicating Ocean Science
EPS 102	History and Evolution of Planet Earth
EPS 103	Introduction to Aquatic and Marine Geochemistry
EPS 109	Computer Simulations in Earth and Planetary Sciences
EPS 115	Stratigraphy and Earth History
EPS 117	Geomorphology
EPS 131	Geochemistry
EPS C178	Applied Geophysics
EPS C180	Air Pollution
EPS C181	Atmospheric Physics and Dynamics

Undergraduate students in the College of Letters & Science must fulfill the following requirements in addition to those required by their major program.

For detailed lists of courses that fulfill college requirements, please review the College of Letters & Sciences (<http://guide.berkeley.edu/archive/2017-18/undergraduate/colleges-schools/letters-science>) page in this Guide.

Entry Level Writing (<http://writing.berkeley.edu/node/78>)

All students who will enter the University of California as freshmen must demonstrate their command of the English language by fulfilling the Entry Level Writing requirement. Fulfillment of this requirement is also a prerequisite to enrollment in all reading and composition courses at UC Berkeley.

American History and American Institutions (<http://guide.berkeley.edu/archive/2017-18/undergraduate/colleges-schools/letters-science/american-history-institutions-requirement>)

The American History and Institutions requirements are based on the principle that a US resident graduated from an American university, should have an understanding of the history and governmental institutions of the United States.

American Cultures (<http://americancultures.berkeley.edu/students/courses>)

American Cultures is the one requirement that all undergraduate students at Cal need to take and pass in order to graduate. The requirement offers an exciting intellectual environment centered on the study of race, ethnicity and culture of the United States. AC courses offer students

opportunities to be part of research-led, highly accomplished teaching environments, grappling with the complexity of American Culture.

Quantitative Reasoning

The Quantitative Reasoning requirement is designed to ensure that students graduate with basic understanding and competency in math, statistics, or computer science. The requirement may be satisfied by exam or by taking an approved course.

Foreign Language

The Foreign Language requirement may be satisfied by demonstrating proficiency in reading comprehension, writing, and conversation in a foreign language equivalent to the second semester college level, either by passing an exam or by completing approved course work.

Reading and Composition

In order to provide a solid foundation in reading, writing, and critical thinking the College requires two semesters of lower division work in composition in sequence. Students must complete a first-level reading and composition course by the end of their second semester and a second-level course by the end of their fourth semester.

Breadth Requirements

The undergraduate breadth requirements provide Berkeley students with a rich and varied educational experience outside of their major program. As the foundation of a liberal arts education, breadth courses give students a view into the intellectual life of the University while introducing them to a multitude of perspectives and approaches to research and scholarship. Engaging students in new disciplines and with peers from other majors, the breadth experience strengthens interdisciplinary connections and context that prepares Berkeley graduates to understand and solve the complex issues of their day.

Unit Requirements

- 120 total units, including at least 60 L&S units
- Of the 120 units, 36 must be upper division units
- Of the 36 upper division units, 6 must be taken in courses offered outside your major department

Residence Requirements

For units to be considered in "residence," you must be registered in courses on the Berkeley campus as a student in the College of Letters & Science. Most students automatically fulfill the residence requirement by attending classes here for four years. In general, there is no need to be concerned about this requirement, unless you go abroad for a semester or year or want to take courses at another institution or through UC Extension during your senior year. In these cases, you should make an appointment to meet an adviser to determine how you can meet the Senior Residence Requirement.

Note: Courses taken through UC Extension do not count toward residence.

Senior Residence Requirement

After you become a senior (with 90 semester units earned toward your BA degree), you must complete at least 24 of the remaining 30 units in residence in at least two semesters. To count as residence, a semester

must consist of at least 6 passed units. Intercampus Visitor, EAP, and UC Berkeley-Washington Program (UCDC) units are excluded.

You may use a Berkeley Summer Session to satisfy one semester of the Senior Residence requirement, provided that you successfully complete 6 units of course work in the Summer Session and that you have been enrolled previously in the college.

Modified Senior Residence Requirement

Participants in the UC Education Abroad Program (EAP) or the UC Berkeley Washington Program (UCDC) may meet a Modified Senior Residence requirement by completing 24 (excluding EAP) of their final 60 semester units in residence. At least 12 of these 24 units must be completed after you have completed 90 units.

Upper Division Residence Requirement

You must complete in residence a minimum of 18 units of upper division courses (excluding EAP units), 12 of which must satisfy the requirements for your major.

Mission

The goal of the earth and planetary sciences (EPS) BA degree is to provide students with a broad and sound education that provides general and specialized knowledge and is intellectually challenging and stimulating. Upon completion of the degree students are ready to enter graduate school at top-ranking institutions (about half of them choose this path), find employment in the profession (geological and environmental engineering and consulting are major opportunities), continue in public education as teachers, or use their background as a sound basis for a new career such as in public policy, law or medical sciences.

Learning Goals for the Major

EPS majors acquire knowledge through course work, laboratory training (expertise in experimental techniques), primary field research, library research, and computer applications, with oral presentations and written reports required in many of our classes.

The undergraduate program provides strong technical training for those who wish to pursue professional careers in the earth, environmental and planetary sciences, as well as training in analytical, creative and critical thinking and communication that serves well those who choose paths in new fields.

The environmental earth science track focuses broadly on the natural sciences, using earth science as a base to expand outward. This track can accommodate the student's interest by incorporating classes in biology, hydrology, hazardous waste management, ecology, and natural resources. Interrelationships are key to this course of study, with an emphasis on how the physical, biological, and chemical processes at the earth's surface affect each other.

This track is excellent preparation for graduate study in environmental science, but it also provides a strong foundation for work within governmental agencies such as the Environmental Protection Agency, Bureau of Land Management, United States Geological Survey or consulting firms, or broader involvement in land use planning, business, policy, law or management. This is a great way to obtain a good science foundation for students who are interested in teaching science in elementary or secondary education.

Undergraduate Student Services Manager

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Faculty Adviser

Professor Lynn Ingram
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EPS Undergraduate Advising Calendar

For advising hours and other advising deadlines, please see the department's advising calendar (<http://eps.berkeley.edu/undergraduate/contact-undergraduate-advisor>).

Environmental Earth Science

ENV SCI 8X Climate Change: The Interface of Science and Public Policy 2 Units

Terms offered: Prior to 2007

The possible impacts of climate changes enhanced by or following from human activities create challenges for planners, policy-makers, industrialists, and all citizens of the globe. This course seeks to examine the science of climate change and the policy issues that follow from that change.

Climate Change: The Interface of Science and Public Policy: Read More [+]

Hours & Format

Summer: 6 weeks - 5 hours of lecture per week

Additional Details

Subject/Course Level: Environmental Sciences/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Berry

Climate Change: The Interface of Science and Public Policy: Read Less [-]

ENV SCI 10 Introduction to Environmental Sciences 3 Units

Terms offered: Fall 2013, Spring 2013, Fall 2012

A survey of biological and physical environmental problems, focusing on geologic hazards, water and air quality, water supply, solid waste, introduced and endangered species, preservation of wetland ecosystems. Interaction of technical, social, and political approaches to environmental management.

Introduction to Environmental Sciences: Read More [+]

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Environmental Sciences/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Introduction to Environmental Sciences: Read Less [-]

ENV SCI 10L Field Study in Environmental Sciences 1 Unit

Terms offered: Fall 2010, Fall 2009, Fall 2008

Field and laboratory studies of Strawberry Creek throughout its course from the hills to the Bay are used to exemplify integration of the physical, biological, and social components of science-based approaches to environmental management.

Field Study in Environmental Sciences: Read More [+]

Rules & Requirements

Prerequisites: 10 (must be taken concurrently)

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of fieldwork per week

Additional Details

Subject/Course Level: Environmental Sciences/Undergraduate

Grading/Final exam status: Letter grade. Final exam not required.

Instructors: Berry, Kondolf

Field Study in Environmental Sciences: Read Less [-]

ENV SCI 24 Freshman Seminar 1 Unit

Terms offered: Fall 2010, Fall 2009, Spring 2009

The Freshman Seminar Program has been designed to provide new students with the opportunity to explore an intellectual topic with a faculty member in a small-seminar setting. Freshman Seminars are offered in all campus departments, and topics vary from department to department and semester to semester. Enrollment limited to fifteen freshmen.

Freshman Seminar: Read More [+]

Rules & Requirements

Repeat rules: Course may be repeated for credit when topic changes. Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of seminar per week

Additional Details

Subject/Course Level: Environmental Sciences/Undergraduate

Grading/Final exam status: The grading option will be decided by the instructor when the class is offered. Final exam required.

Freshman Seminar: Read Less [-]

ENV SCI 84 Sophomore Seminar 1 or 2 Units

Terms offered: Spring 2011, Fall 2010, Spring 2010

Sophomore seminars are small interactive courses offered by faculty members in departments all across the campus. Sophomore seminars offer opportunity for close, regular intellectual contact between faculty members and students in the crucial second year. The topics vary from department to department and semester to semester. Enrollment limited to 15 sophomores.

Sophomore Seminar: Read More [\[+\]](#)

Rules & Requirements

Prerequisites: At discretion of instructor

Repeat rules: Course may be repeated for credit when topic changes. Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring:

5 weeks - 3-6 hours of seminar per week
10 weeks - 1.5-3 hours of seminar per week
15 weeks - 1-2 hours of seminar per week

Summer:

6 weeks - 2.5-5 hours of seminar per week
8 weeks - 1.5-3.5 hours of seminar and 2-4 hours of seminar per week

Additional Details

Subject/Course Level: Environmental Sciences/Undergraduate

Grading/Final exam status: The grading option will be decided by the instructor when the class is offered. Final exam required.

Sophomore Seminar: Read Less [\[-\]](#)

ENV SCI 100 Introduction to the Methods of Environmental Science 4 Units

Terms offered: Spring 2013, Spring 2012, Spring 2011

Introduction to basic methods used in environmental research by biological, physical, and social scientists. The course is designed to teach skills necessary for majors to conduct independent thesis research in the required senior seminar, 196A-196B/196L. Topics include development of research questions, sampling methods, experimental design, statistical analysis, scientific writing and graphics, and introductions to special techniques for characterizing environmental conditions and features. This course is the prerequisite to 196A, from which the senior thesis topic statement is determined.

Introduction to the Methods of Environmental Science: Read More [\[+\]](#)

Rules & Requirements

Prerequisites: Environmental science statistics requirement. Open only to declared environmental sciences majors

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture, 1 hour of discussion, and 1.5 hours of fieldwork per week

Additional Details

Subject/Course Level: Environmental Sciences/Undergraduate

Grading/Final exam status: Letter grade. Final exam not required.

Introduction to the Methods of Environmental Science: Read Less [\[-\]](#)

ENV SCI 125 Environments of the San Francisco Bay Area 3 Units

Terms offered: Spring 2011, Spring 2010, Spring 2009

The weather and climate, plants and animals, geology, landforms, and soils of the Bay Area, with an emphasis on the interaction of these physical elements, their modification by humans, and problems deriving from human use.

Environments of the San Francisco Bay Area: Read More [\[+\]](#)

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Environmental Sciences/Undergraduate

Grading/Final exam status: Letter grade. Final exam not required.

Instructor: Berry

Environments of the San Francisco Bay Area: Read Less [\[-\]](#)