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 broadly on the natural sciences by primarily using earth science 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 the written report is judged by the student's research supervisor and a departmental adviser.

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/undergraduate/degree-programs/atmospheric-science) (Major and Minor)
Geology (http://guide.berkeley.edu/undergraduate/degree-programs/geology) (Major and Minor)
Geophysics (http://guide.berkeley.edu/undergraduate/degree-programs/geophysics) (Major and Minor)
Marine Science (http://guide.berkeley.edu/undergraduate/degree-programs/marine-science) (Major and Minor)
Planetary Science (http://guide.berkeley.edu/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 Analytic Geometry and Calculus
& MATH 16B and Analytic Geometry and Calculus
MATH 1A Calculus
& MATH 1B and Calculus
MATH 10A Methods of Mathematics: Calculus, Statistics, and Combinatorics
& MATH 10B and Methods of Mathematics: Calculus, Statistics, and Combinatorics
CHEM 1A General Chemistry
& 1AL and General Chemistry Laboratory
or CHEM 4A General Chemistry and Quantitative Analysis
BIOLOGY 1B General Biology Lecture and Laboratory 4
Select one of the following physics sequences:
PHYSICS 5A Introductory Mechanics and Relativity
& PHYSICS 5Band Introductory Electromagnetism, Waves, and Optics
PHYSICS 8A Introductory Physics
& PHYSICS 8Band Introductory Physics
PHYSICS 7A Physics for Scientists and Engineers
& PHYSICS 7Band 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
ENE,RES 102 Quantitative Aspects of Global Environmental Problems 4
Electives, select 12 upper division units from the following list of suggested courses: 2
EPS 100A Minerals: Their Constitution and Origin [4]
EPS 100B Genesis and Interpretation of Rocks [4]
EPS C100 Communicating Ocean Science [4]
EPS 103/203 Introduction to Aquatic and Marine Geochemistry [4]
EPS 108 Geodynamics [4]
Memoranda section, but they are not noted on diplomas. Students who have a strong interest in an area of study outside their major often decide to complete a minor program. These programs allow students to explore areas of interest in greater depth. Students are encouraged to complete a minor in areas related to their major or to pursue a completely different field. The minor 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. 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.

### 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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>EPS 115</td>
<td>Stratigraphy and Earth History [4]</td>
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<tr>
<td>EPS 122</td>
<td>Physics of the Earth and Planetary Interiors [3]</td>
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<tr>
<td>EPS 124</td>
<td>Isotopic Geochemistry [4]</td>
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<tr>
<td>EPS 125</td>
<td>Stable Isotope Geochemistry [4]</td>
<td></td>
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<tr>
<td>EPS 131</td>
<td>Geochemistry [4]</td>
<td></td>
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<tr>
<td>EPS C146</td>
<td>Geological Oceanography [4]</td>
<td></td>
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<tr>
<td>EPS C178</td>
<td>Applied Geophysics [3]</td>
<td></td>
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<tr>
<td>EPS C180</td>
<td>Air Pollution [3]</td>
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<tr>
<td>EPS C181</td>
<td>Atmospheric Physics and Dynamics [3]</td>
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<tr>
<td>ESPM 120</td>
<td>Soil Characteristics [3]</td>
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<tr>
<td>ESPM C125</td>
<td>Biogeography [4]</td>
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<tr>
<td>ESPM C128</td>
<td>Chemistry of Soils [3]</td>
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<tr>
<td>ESPM 130A</td>
<td>Forest Hydrology [4]</td>
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<tr>
<td>GEOG C136</td>
<td>Terrestrial Hydrology [4]</td>
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<tr>
<td>CIV ENG 115</td>
<td>Water Chemistry [3]</td>
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<tr>
<td>GEOG 140A</td>
<td>Physical Landscapes: Process and Form [4]</td>
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<tr>
<td>GEOG 140B</td>
<td>Physiography and Geomorphologic Extremes [4]</td>
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<tr>
<td>GEOG 142</td>
<td>Climate Dynamics [4]</td>
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<td>GEOG 143</td>
<td>Global Change Biogeochemistry [3]</td>
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<tr>
<td>GEOG 144</td>
<td>Principles of Meteorology [3]</td>
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<tr>
<td>INTEGBI 113L</td>
<td>Paleobiological Perspectives on Ecology and Evolution [4]</td>
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<tr>
<td>INTEGBI 153</td>
<td>Ecology [3]</td>
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<td>INTEGBI C155</td>
<td>Holocene Paleocology: How Humans Changed the Earth [3]</td>
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<td>INTEGBI 159</td>
<td>The Living Planet: Impact of the Biosphere on the Earth System [3]</td>
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<tr>
<td>INTEGBI 160</td>
<td>Evolution [4]</td>
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<tr>
<td>INTEGBI 184L</td>
<td>Morphology of the Vertebrate Skeleton with Laboratory [4]</td>
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</tbody>
</table>

This course can only be taken during the student's senior year.

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.

#### Upper Division

Select a minimum of five of the following:

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<tr>
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<tr>
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<td>Minerals: Their Constitution and Origin [4]</td>
<td></td>
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<tr>
<td>EPS 100B</td>
<td>Genesis and Interpretation of Rocks [4]</td>
<td></td>
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<tr>
<td>EPS C100</td>
<td>Communicating Ocean Science [4]</td>
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<tr>
<td>EPS 102</td>
<td>History and Evolution of Planet Earth [4]</td>
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<tr>
<td>EPS 103</td>
<td>Introduction to Aquatic and Marine Geochemistry [4]</td>
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<tr>
<td>EPS 115</td>
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<td>Atmospheric Physics and Dynamics [3]</td>
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</tr>
</tbody>
</table>

Undergraduate students 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/undergraduate/colleges-schools/letters-science) page in this Guide. For College advising appointments, please visit the L&S Advising (https://ls.berkeley.edu/advising/about-undergraduate-advising-services) Pages.

### University of California Requirements

#### 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/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.

#### Berkeley Campus Requirement

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

All undergraduate students at Cal need to take and pass this course 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.

**College of Letters & Science Essential Skills Requirements**

**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 parts A & B reading
and composition courses by the end of their second semester and a
second-level course by the end of their fourth semester.

**College of Letters & Science 7 Course Breadth Requirements**

**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
- 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), Berkeley
Summer Abroad, 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 UCEAP 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**

Nadine Spingola-Hutton
nspringola@berkeley.edu
510-643-4068

**Faculty Adviser**

Professor Bruce Buffett
bbuffett@berkeley.edu

**EPS Undergraduate Appointments**

To make an appointment, please visit the Contact Undergraduate Adviser website (http://eps.berkeley.edu/undergraduate/contact-undergraduate-advisor).

**Environmental Earth Science**

Expand all course descriptions [+ ]Collapse all course descriptions [- ]

**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.

**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 [-]