Geophysics

Bachelor of Arts (BA)

The Geophysics major is designed to provide students with theoretical, field and laboratory experience in studying geodynamic processes and the structure of the Earth and other planets. It is designed for students with good physics and mathematics ability. It provides a solid background in physical science and mathematics with an emphasis on the physics of the Earth.

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 at the University; and 2) carry out an individual research or study project, involving at least three 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. 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 major adviser and the geophysics 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)
Environmental Earth Science (http://guide.berkeley.edu/archive/2017-18/undergraduate/degree-programs/environmental-earth-science) (Major and Minor)
Geology (http://guide.berkeley.edu/archive/2017-18/undergraduate/degree-programs/geology) (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
MATH 1A	Calculus	4
MATH 1B	Calculus	4
MATH 53	Multivariable Calculus	4
MATH 54	Linear Algebra and Differential Equations	4
or PHYSICS 89	Introduction to Mathematical Physics	
CHEM 1A & 1AL	General Chemistry and General Chemistry Laboratory	4
or CHEM 4A	General Chemistry and Quantitative Analysis	
Choose one of the following physics sequences:		
PHYSICS 5A & PHYSICS 5B & PHYSICS 5C	Introductory Mechanics and Relativity and Introductory Electromagnetism, Waves, and Optics and Introductory Thermodynamics and Quantum Mechanics	
PHYSICS 7A & PHYSICS 7B & PHYSICS 7C	Physics for Scientists and Engineers and Physics for Scientists and Engineers and Physics for Scientists and Engineers	

Upper Division Requirements

EPS 102	History and Evolution of Planet Earth	4
EPS 122	Physics of the Earth and Planetary Interiors	3
EPS 150	Case Studies in Earth Systems	2
MATH 121A	Mathematical Tools for the Physical Sciences	4
or EPS 104	Mathematical Methods in Geophysics	
Electives, select 11 upper division units, from the following list of suggested courses: [1]		11
EPS 100A	Minerals: Their Constitution and Origin	
EPS 100B	Genesis and Interpretation of Rocks	
EPS 101	Field Geology and Digital Mapping	
EPS 108	Geodynamics	
EPS 109	Computer Simulations in Earth and Planetary Sciences	
EPS 111	Petroleum Geology	
EPS 116	Structural Geology and Tectonics	
EPS 117	Geomorphology	
EPS 125	Stable Isotope Geochemistry	
EPS 130	Strong Motion Seismology	
EPS C162	Planetary Astrophysics	
EPS C178	Applied Geophysics	
PHYSICS 105	Analytic Mechanics	
PHYSICS 110A	Electromagnetism and Optics	

[1] 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
Upper Division		
Select a minimum of five upper division courses from the following: [1]		
EPS 104	Mathematical Methods in Geophysics	
EPS 108	Geodynamics	
EPS 109	Computer Simulations in Earth and Planetary Sciences	
EPS 122	Physics of the Earth and Planetary Interiors	
EPS 130	Strong Motion Seismology	
EPS C178	Applied Geophysics	

[1] Other courses may be substituted with approval of the faculty adviser.

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 Science (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.

Geophysics seeks to understand the vast and complicated body that is the Earth. Because most of the Earth's interior is inaccessible to direct observation, the geophysicist uses the basic principles of physics to devise indirect methods of exploring those parts of the Earth that cannot be reached by shovel or drill bit. Measurements of magnetic fields, electric potential, gravity, seismic waves, and satellite-based geodesy are used to probe the interior and study surface and internal processes of our planet, and to answer questions concerning how continents move, mountains form, earthquakes shake, and volcanoes erupt, as well as improving our understanding of planetary to local scale structure and processes. These questions require an interdisciplinary approach that links the disciplines of mathematics, physics, geology, and chemistry. Moreover, the geophysics study encompasses theoretical and experimental science as well as fieldwork to study geodynamic processes and the structure of the Earth and other planets, and employed methods are used for identification and recovery of natural resources, the characterization of natural hazards from earthquakes and volcanoes, and are used for environmental studies and remediation.

Undergraduate Student Services Manager

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EPS Undergraduate Advising Calendar

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