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 advisor 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 advisor, 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 major advisor and the geophysics 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)
Environmental Earth Science (http://guide.berkeley.edu/undergraduate/degree-programs/environmental-earth-science/) (Major and Minor)
Geology (http://guide.berkeley.edu/undergraduate/degree-programs/geology/) (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 two upper division courses may be used to simultaneously fulfill requirements for a student's double major and no more one course may be used to fulfill minor program requirements 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.
4. For more information on AP/IB Exam Scores & A-Level Course Equivalencies for EPS Majors, please see here (https://docs.google.com/document/d/1ENLPR2Vfocv-nc45cw0_pVexG2BEM65Ip1h2eB3ha6E/edit/?usp=sharing).

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	5
or CHEM 4A	General Chemistry and Quantitative Analysis	
Choose one of the following physics sequences:		
PHYSICS 5A & PHYSICS 5B & PHYSICS 5B & PHYSICS 5C & PHYSICS 5C	Introductory Mechanics and Relativity and Introductory Electromagnetism, Waves, and Optics and Introduction to Experimental Physics I and Introductory Thermodynamics and Quantum Mechanics and Introduction to Experimental Physics II	
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
Electives, select 15 upper division units, from the following list of suggested courses: [1]		15
EPS 100A	Minerals: Their Constitution and Origin [4]	
EPS 100B	Genesis and Interpretation of Rocks [4]	
EPS 101	Field Geology and Digital Mapping [4]	
EPS 104	Mathematical Methods in Geophysics [4]	
EPS 108	Geodynamics [4]	
EPS 109	Computer Simulations with Jupyter Notebooks [4]	
EPS 116	Structural Geology and Tectonics [3]	
EPS 117	Geomorphology [4]	
EPS 118	Advanced Field Course [4]	
EPS 125	Stable Isotope Geochemistry [4]	
EPS 130	Strong Motion Seismology [3]	
EPS C162	Planetary Astrophysics [4]	
EPS C178	Applied Geophysics [3]	
MATH 121A	Mathematical Tools for the Physical Sciences [4]	
or EPS 104	Mathematical Methods in Geophysics	

PHYSICS 105	Analytic Mechanics [4]	
PHYSICS 110A	Electromagnetism and Optics [4]	

[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.

General Guidelines

1. All minors must be declared before the first day of classes in your Expected Graduation Term (EGT). For summer graduates, minors must be declared prior to the first day of Summer Session A.
2. All upper-division courses must be taken for a letter grade.
3. A minimum of three of the upper-division courses taken to fulfill the minor requirements must be completed at UC Berkeley.
4. A minimum grade point average (GPA) of 2.0 is required in the upper-division courses to fulfill the minor requirements.
5. Courses used to fulfill the minor requirements may be applied toward the Seven-Course Breadth requirement, for Letters & Science students.
6. No more than one upper division course may be used to simultaneously fulfill requirements for a student's major and minor programs.
7. All minor requirements must be completed prior to the last day of finals during the semester in which the student plans to graduate. If students cannot finish all courses required for the minor by that time, they should see a College of Letters & Science adviser.
8. 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 [4]	
EPS 108	Geodynamics [4]	
EPS 109	Computer Simulations with Jupyter Notebooks [4]	
EPS 122	Physics of the Earth and Planetary Interiors [3]	
EPS 130	Strong Motion Seismology [3]	
EPS C178	Applied Geophysics [3]	

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

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://lsadvising.berkeley.edu/home/) Pages.

University of California Requirements

Entry Level Writing (http://guide.berkeley.edu/undergraduate/colleges-schools/letters-science/entry-level-writing-requirement/)

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 (http://guide.berkeley.edu/undergraduate/colleges-schools/letters-science/quantitative-reasoning-requirement/)

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 (http://guide.berkeley.edu/undergraduate/colleges-schools/letters-science/foreign-language-requirement/)

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 (http://guide.berkeley.edu/undergraduate/colleges-schools/letters-science/reading-composition-requirement/)

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 in sequential order by the end of their fourth semester.

College of Letters & Science 7 Course Breadth Requirements

Breadth Requirements **(**http://guide.berkeley.edu/undergraduate/colleges-schools/letters-science/#breadthrequirementstext**)**

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, or two years for transfer students. 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 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

epsua@berkeley.edu

Faculty Advisor

Professor Doug Dreger (http://eps.berkeley.edu/people/douglas-dreger/)
ddreger@berkeley.edu

EPS Undergraduate Appointments

To make an appointment, please visit the EPS Student Services page (http://eps.berkeley.edu/undergraduate/contact-student-services-advisors/).

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

EPS 3 The Water Planet 3 Units

Terms offered: Spring 2021, Summer 2020 8 Week Session, Spring 2020
An overview of the processes that control water supply to natural ecosystems and human civilization. Hydrologic cycle, floods, droughts, groundwater. Patterns of water use, threats to water quality, effects of global climate change on future water supplies. Water issues facing California.
The Water Planet: Read More [+]
Hours & Format

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

Summer: 8 weeks - 6 hours of lecture per week

Additional Details

Subject/Course Level: Earth and Planetary Science/Undergraduate

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

The Water Planet: Read Less [-]

EPS 7 Introduction to Climate Change 3 Units

Terms offered: Fall 2024, Summer 2024 First 6 Week Session, Fall 2022
This course covers the physical processes that determine Earth's past, present, and future climate, with a particular focus on the essentially irreversible climate change (a.k.a., global warming) caused by the burning of coal, oil, and natural gas. Topics will also
include the estimation of future warming and impacts, the Earth resources that can be used to combat climate change, and the policies being used to shift towards the use of those resources.
Introduction to Climate Change: Read More [+]
Hours & Format

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

Summer:
3 weeks - 16 hours of lecture per week
6 weeks - 8 hours of lecture per week

Additional Details

Subject/Course Level: Earth and Planetary Science/Undergraduate

Grading/Final exam status: Letter grade. Final exam required, with common exam group.

Instructor: David Romps

Introduction to Climate Change: Read Less [-]

EPS 10 Earth's Greatest Volcanic Eruptions 3 Units

Terms offered: Prior to 2007
A science-based course on the most significant eruptions Earth has produced. Most eruptions discussed will be from within historic time and will involve information from geology (volcanology), geography, archaeology, history, art, and paleoenvironmental records such as tree-rings and ice-cores. After a two-class introduction to volcanoes, volcanic activity, and volcanology, and the hazards vs benefits of eruptions, each class will feature one of more eruptions of different types from around the world. A science-based interpretation of the eruptions and effects on human-kind and the environment, will be presented. Class participants will learn about one type of natural hazard, its causes, and the variability of volcanism on Earth.
Earth's Greatest Volcanic Eruptions: Read More [+]
Hours & Format

Summer: 6 weeks - 8 hours of lecture per week

Additional Details

Subject/Course Level: Earth and Planetary Science/Undergraduate

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

Instructors: Self, Manga

Earth's Greatest Volcanic Eruptions: Read Less [-]

EPS C12 The Planets 3 Units

Terms offered: Spring 2024, Spring 2023, Spring 2022
A tour of the mysteries and inner workings of our solar system. What are planets made of? Why do they orbit the sun the way they do? How do planets form, and what are they made of? Why do some bizarre moons have oceans, volcanoes, and ice floes? What makes the Earth hospitable for life? Is the Earth a common type of planet or some cosmic quirk? This course will introduce basic physics, chemistry, and math to understand planets, moons, rings, comets, asteroids, atmospheres, and oceans. Understanding other worlds will help us save our own planet and help us understand our place in the universe.
The Planets: Read More [+]
Hours & Format

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

Summer: 6 weeks - 7.5 hours of lecture and 2.5 hours of discussion per week

Additional Details

Subject/Course Level: Earth and Planetary Science/Undergraduate

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

Instructors: Jeanloz, Dressing

Also listed as: ASTRON C12/L & S C70T

The Planets: Read Less [-]

EPS W12 The Planets 3 Units

Terms offered: Summer 2024 8 Week Session, Summer 2023 8 Week Session, Summer 2022 8 Week Session
A tour of the mysteries and inner workings of our solar system. What are planets made of? Why do they orbit the sun the way they do? How do planets form, and what are they made of? Why do some bizarre moons have oceans, volcanoes, and ice floes? What makes the Earth hospitable for life? Is the Earth a common type of planet or some cosmic quirk? This course will introduce basic physics, chemistry, and math to understand planets, moons, rings, comets, asteroids, atmospheres, and oceans. Understanding other worlds will help us save our own planet and help us understand our place in the universe. This course is web-based.
The Planets: Read More [+]
Hours & Format

Summer: 8 weeks - 6 hours of web-based lecture per week

Online: This is an online course.

Additional Details

Subject/Course Level: Earth and Planetary Science/Undergraduate

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

Instructor: Militzer

Formerly known as: Astronomy W12/Earth and Planetary Science W12

Also listed as: ASTRON W12

The Planets: Read Less [-]

EPS 20 Earthquakes in Your Backyard 3 Units

Terms offered: Summer 2024 First 6 Week Session, Summer 2024 Second 6 Week Session, Summer 2023 Second 6 Week Session
Introduction to earthquakes, their causes and effects. General discussion of basic principles and methods of seismology and geological tectonics, distribution of earthquakes in space and time, effects of earthquakes, and earthquake hazard and risk, with particular emphasis on the situation in California.
Earthquakes in Your Backyard: Read More [+]
Hours & Format

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

Summer: 6 weeks - 5 hours of lecture per week

Additional Details

Subject/Course Level: Earth and Planetary Science/Undergraduate

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

Formerly known as: Geophysics 20

Earthquakes in Your Backyard: Read Less [-]

EPS C20 Earthquakes in Your Backyard 3 Units

Terms offered: Fall 2024, Spring 2024, Fall 2023
Introduction to earthquakes, their causes and effects. General discussion of basic principles and methods of seismology and geological tectonics, distribution of earthquakes in space and time, effects of earthquakes, and earthquake hazard and risk, with particular emphasis on the situation in California.
Earthquakes in Your Backyard: Read More [+]
Hours & Format

Fall and/or spring: 15 weeks - 2-3 hours of lecture and 1-0 hours of discussion per week

Summer: 6 weeks - 7.5 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Earth and Planetary Science/Undergraduate

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

Also listed as: L & S C70Y

Earthquakes in Your Backyard: Read Less [-]

EPS 24 Freshman Seminar in Earth and Planetary Sciences 1 Unit

Terms offered: Fall 2024, Fall 2023, Fall 2022
The freshman seminar in earth and planetary science is designed to provide new students with an opportunity to explore a topic in geology or earth sciences with a faculty member in a small seminar setting. Topics will vary from semester to semester but will include such possible topics as great voyages of geologic discovery and the role of atmospheric sciences in geologic study.
Freshman Seminar in Earth and Planetary Sciences: Read More [+]
Rules & Requirements

Repeat rules: 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: Earth and Planetary Science/Undergraduate

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

Formerly known as: Geology 24

Freshman Seminar in Earth and Planetary Sciences: Read Less [-]

EPS 39 Freshman/Sophomore Seminar 2 Units

Terms offered: Spring 2022, Fall 2019, Spring 2019
Freshman and sophomore seminars offer lower division students the opportunity to explore an intellectual topic with a faculty member and a group of peers in a small-seminar setting. These seminars are offered in all campus departments; topics vary from department to department and from semester to semester.
Freshman/Sophomore Seminar: Read More [+]
Rules & Requirements

Prerequisites: Priority given to freshmen and sophomores

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

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

Additional Details

Subject/Course Level: Earth and Planetary Science/Undergraduate

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

Formerly known as: Geology 39

Freshman/Sophomore Seminar: Read Less [-]

EPS 39A Freshman/Sophomore Seminar 2 - 4 Units

Terms offered: Spring 2018, Spring 2017, Spring 2016
Freshman and sophomore seminars offer lower division students the opportunity to explore an intellectual topic with a faculty member and a group of peers in a small-seminar setting. These seminars are offered in all campus departments; topics vary from department to department and from semester to semester.
Freshman/Sophomore Seminar: Read More [+]
Rules & Requirements

Prerequisites: Priority given to freshmen and sophomores

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 2-4 hours of seminar per week

Summer: 6 weeks - 5-10 hours of seminar per week

Additional Details

Subject/Course Level: Earth and Planetary Science/Undergraduate

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

Formerly known as: Geology 39

Freshman/Sophomore Seminar: Read Less [-]

EPS 50 The Planet Earth 4 Units

Terms offered: Fall 2024, Spring 2024, Fall 2023
An introduction to the physical and chemical processes that have shaped the earth through time, with emphasis on the theory of plate tectonics. Laboratory work will involve the practical study of minerals, rocks, and geologic maps and exercises on geological processes.
The Planet Earth: Read More [+]
Hours & Format

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

Summer: 8 weeks - 7.5 hours of lecture and 7.5 hours of laboratory per week

Additional Details

Subject/Course Level: Earth and Planetary Science/Undergraduate

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

Formerly known as: Geology 50

The Planet Earth: Read Less [-]

EPS 80 Environmental Earth Sciences 3 Units

Terms offered: Fall 2024, Summer 2024 Second 6 Week Session, Fall 2023
This course focuses on the processes on and in the earth that shape the environment. Humanity's use of land and oceans is examined based on an understanding of these processes.
Environmental Earth Sciences: Read More [+]
Rules & Requirements

Credit Restrictions: Students will receive no credit for 80 after taking Integrative Biology 80 or Paleontology 15.

Hours & Format

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

Summer: 6 weeks - 7.5 hours of lecture per week

Additional Details

Subject/Course Level: Earth and Planetary Science/Undergraduate

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

Environmental Earth Sciences: Read Less [-]

EPS 81 Extreme Weather and Climate 3 Units

Terms offered: Spring 2024, Spring 2023, Spring 2020
This course provides a fundamental understanding of the extreme weather and climate variability that have affected Earth in recent decades. We begin with an overview of fire weather and hurricanes, using these phenomena to explore general principles that are also relevant to drought, tornadoes, and other extreme weather. Then we examine how atmospheric composition, planetary orbits, and radiation control global climate, and how all of these influence extreme weather. Additional topics include prediction of complex systems, chaos theory, feedbacks, instability, atmospheric aerosols, and air pollution. We use the atmospheres of other planets for comparison, learning more about Earth by seeing just how different planetary climate can be.
Extreme Weather and Climate: Read More [+]
Hours & Format

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

Additional Details

Subject/Course Level: Earth and Planetary Science/Undergraduate

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

Instructor: Boos

Extreme Weather and Climate: Read Less [-]

EPS 82 Oceans 3 Units

Terms offered: Fall 2024, Fall 2023, Fall 2022
This course offers multidisciplinary approach to begin answering the question "Why are oceans important to us?" Upon a physical, chemical, and geologic base, we introduce the alien world of sea life, the importance of the ocean to the global carbon cycle, and the principles of ecology with a focus on the important concept of energy flow through food webs. Lectures expand beyond science to include current topics as diverse as music, movies, mythology, biomechanics, policy, and trade.
Oceans: Read More [+]
Rules & Requirements

Credit Restrictions: Students will receive no credit for EPS 82 after completing EPS N82.

Hours & Format

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

Summer:
6 weeks - 7.5 hours of lecture and 2.5 hours of discussion per week
8 weeks - 5.5 hours of lecture and 1.5 hours of discussion per week

Additional Details

Subject/Course Level: Earth and Planetary Science/Undergraduate

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

Instructors: Bishop, Edwards

Formerly known as: Earth and Planetary Science C82/Integrative Biology C82

Oceans: Read Less [-]

EPS N82 Introduction to Oceans 3 Units

Terms offered: Summer 2024 First 6 Week Session, Summer 2024 Second 6 Week Session, Summer 2023 Second 6 Week Session
The geology, physics, chemistry, and biology of the world oceans. The application of oceanographic sciences to human problems will be explored through special topics such as energy from the sea, marine pollution, food from the sea, and climate change.
Introduction to Oceans: Read More [+]
Rules & Requirements

Credit Restrictions: Students will receive no credit for Earth and Planetary Science N82 after taking Earth and Planetary Science/ Integrative Biology/Geography C82.

Hours & Format

Summer:
6 weeks - 6 hours of lecture per week
8 weeks - 6 hours of lecture per week

Additional Details

Subject/Course Level: Earth and Planetary Science/Undergraduate

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

Introduction to Oceans: Read Less [-]

EPS 84 Sophomore Seminar 1 or 2 Units

Terms offered: Spring 2013, Fall 2012, Spring 2012
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: Earth and Planetary Science/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 [-]

EPS 88 PyEarth: A Python Introduction to Earth Science 2 Units

Terms offered: Fall 2024, Fall 2023, Spring 2023
Earthquakes and El Ninos are examples of natural hazards in California. The course uses Python/Jupyter Notebook and real-world observations to introduce students to these and other Earth phenomena and their underlying physics. The students will learn how to access and visualize the data, extract signals, and make probability forecasts. The final module is a project that synthesizes the course material to make a probabilistic forecast. The course will be co-taught by a team of EPS faculty, and the focus of each semester will depend on the expertise of the faculty in charge.
PyEarth: A Python Introduction to Earth Science: Read More [+]
Hours & Format

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

Additional Details

Subject/Course Level: Earth and Planetary Science/Undergraduate

Grading/Final exam status: Letter grade. Alternate method of final assessment during regularly scheduled final exam group (e.g., presentation, final project, etc.).

Instructors: Fung, Boos, Dreger

PyEarth: A Python Introduction to Earth Science: Read Less [-]

EPS 98 Directed Group Study 1 - 4 Units

Terms offered: Spring 2012, Spring 2009, Spring 2008
Group studies of selected topics which vary from semester to semester.
Directed Group Study: Read More [+]
Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of directed group study per week

Additional Details

Subject/Course Level: Earth and Planetary Science/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

Formerly known as: Geology and Geophysics 98

Directed Group Study: Read Less [-]

EPS 100A Minerals: Their Constitution and Origin 4 Units

Terms offered: Fall 2024, Fall 2023, Fall 2022
Introduction to structural, compositional, and physical properties of minerals, their analogs and related substances, their genesis in various geological and synthetic processes, and laboratory techniques to identify and investigate minerals. One field trip to selected mineral deposits and visits to laboratories.
Minerals: Their Constitution and Origin: Read More [+]
Rules & Requirements

Prerequisites: Some background in chemistry and physics

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 6 hours of laboratory per week

Additional Details

Subject/Course Level: Earth and Planetary Science/Undergraduate

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

Formerly known as: Geology 100A

Minerals: Their Constitution and Origin: Read Less [-]

EPS 100B Genesis and Interpretation of Rocks 4 Units

Terms offered: Spring 2024, Spring 2023, Spring 2022
Introduction to the principal geologic environments where rocks are formed and displayed. Igneous, sedimentary, and metamorphic processes discussed in the context of global tectonics.
Genesis and Interpretation of Rocks: Read More [+]
Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 4 hours of laboratory per week

Additional Details

Subject/Course Level: Earth and Planetary Science/Undergraduate

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

Formerly known as: Geology 100B

Genesis and Interpretation of Rocks: Read Less [-]

EPS C100 Communicating Ocean Science 4 Units

Terms offered: Spring 2020, Spring 2018, Spring 2016, Spring 2015
For undergraduates interested in improving their ability to communicate their scientific knowledge by teaching ocean science in elementary schools or science centers/aquariums. The course will combine instruction in inquiry-based teaching methods and learning pedagogy with six weeks of supervised teaching experience in a local school classroom or the Lawrence Hall of Science with a partner. Thus, students will practice communicating scientific knowledge and receive mentoring on how to improve their presentations.
Communicating Ocean Science: Read More [+]
Rules & Requirements

Prerequisites: One course in introductory biology, geology, chemistry, physics, or marine science required and interest in ocean science; junior, senior, or graduate standing; consent of instructor required for sophomores

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 2 hours of fieldwork per week

Additional Details

Subject/Course Level: Earth and Planetary Science/Undergraduate

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

Instructor: Rhew

Formerly known as: Earth and Planetary Science C100/Geography C146/Integrative Biology C100

Also listed as: GEOG C146/INTEGBI C100

Communicating Ocean Science: Read Less [-]

EPS 101 Field Geology and Digital Mapping 4 Units

Terms offered: Fall 2024, Fall 2023, Fall 2022
Geological mapping, field observation, and problem-solving in the Berkeley hills and environs leading to original interpretation of geological processes and history from stratigraphic, structural, and lithological investigations. Integration of the Berkeley hills geology into the Coast Ranges and California as a whole through field trips to key localities. Training in digital field mapping, global positioning systems, and laser surveying. Interdisciplinary focus encourages participation by nonmajors.
Field Geology and Digital Mapping: Read More [+]
Rules & Requirements

Prerequisites: 50 or equivalent introductory course in Earth and Planetary Science

Hours & Format

Fall and/or spring: 15 weeks - 7 hours of fieldwork and 2 hours of lecture per week

Additional Details

Subject/Course Level: Earth and Planetary Science/Undergraduate

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

Formerly known as: Geology 101

Field Geology and Digital Mapping: Read Less [-]

EPS 102 History and Evolution of Planet Earth 4 Units

Terms offered: Fall 2024, Fall 2023, Fall 2022
Formation and evolution of the earth. Nucleosynthesis; formation of the solar system; planetary accretion; dating the earth and solar system; formation of the core, mantle, oceans, and atmosphere; plate tectonics; heat transfer and internal dynamics; stratigraphic record of environment, and evolution; climate history and climate change.
History and Evolution of Planet Earth: Read More [+]
Rules & Requirements

Prerequisites: 50

Hours & Format

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

Additional Details

Subject/Course Level: Earth and Planetary Science/Undergraduate

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

History and Evolution of Planet Earth: Read Less [-]

EPS 103 Introduction to Aquatic and Marine Geochemistry 4 Units

Terms offered: Spring 2024, Spring 2023, Spring 2022
Introduction to marine geochemistry: the global water cycle; processes governing the distribution of chemical species within the hydrosphere; ocean circulation; chemical mass balances, fluxes, and reactions in the marine environment from global to submicron scales; carbon system equilibrium chemistry and biogeochemistry of fresh and salt walter; applications of natural and anthropogenic stable and radioactive tracers; internal ocean processes. Students participate in a one day field trip to sample and analyze waters in the vicinity of Tomales Bay and Point Reyes.
3 hours of lecture and 1.5 hours of discussion week, and a 10 hour field trip.
Introduction to Aquatic and Marine Geochemistry: Read More [+]
Rules & Requirements

Prerequisites: Chemistry 1A, Mathematics 1A or 16A. C82 recommended

Hours & Format

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

Additional Details

Subject/Course Level: Earth and Planetary Science/Undergraduate

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

Instructor: Bishop

Introduction to Aquatic and Marine Geochemistry: Read Less [-]

EPS 104 Mathematical Methods in Geophysics 4 Units

Terms offered: Spring 2024, Spring 2023, Spring 2022
Linear systems. Linear inverse problems, least squares; generalized inverse, resolution; Fourier series, integral transforms; time series analysis, spherical harmonics; partial differntial equations of geophysics; functions of a complex variable; probability and significance tests, maximum likelihood methods. Intended for students in geophysics and other physical sciences.
Mathematical Methods in Geophysics: Read More [+]
Rules & Requirements

Prerequisites: Mathematics 53-54

Hours & Format

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

Additional Details

Subject/Course Level: Earth and Planetary Science/Undergraduate

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

Formerly known as: Geophysics 104

Mathematical Methods in Geophysics: Read Less [-]

EPS 108 Geodynamics 4 Units

Terms offered: Spring 2023, Spring 2021, Spring 2019
Basic principles in studying the physical properties of earth materials and the dynamic processes of the earth. Examples are drawn from tectonics, mechanics of earthquakes, etc., to augment course material.
Geodynamics: Read More [+]
Rules & Requirements

Prerequisites: EPS 50, Physics 7A, or Mathematics 53, 54

Hours & Format

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

Additional Details

Subject/Course Level: Earth and Planetary Science/Undergraduate

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

Geodynamics: Read Less [-]

EPS 109 Computer Simulations with Jupyter Notebooks 4 Units

Terms offered: Fall 2024, Fall 2023, Fall 2022
Introduction to modern computer simulation methods and their application to selected Earth and Planetary Science problems. In hands-on computer labs, students will learn about numerical algorithms, learn to program and modify provided programs, and display the solution graphically. This is an introductory course and no programming experience is required. Examples include fractals in geophysics, properties of materials at high pressure, celestial mechanics, and diffusion processes in the Earth. Topics range from ordinary and partial differential equations to molecular dynamics and Monte Carlo simulations.
Computer Simulations with Jupyter Notebooks: Read More [+]
Rules & Requirements

Prerequisites: Math 1A or equivalent

Hours & Format

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

Additional Details

Subject/Course Level: Earth and Planetary Science/Undergraduate

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

Computer Simulations with Jupyter Notebooks: Read Less [-]

EPS 113 Biological Oceanography and Biogeochemistry 4 Units

Terms offered: Spring 2024, Spring 2023, Spring 2022
We will survey the biological oceanography underlying geochemical transformations in the sea. Students will develop a strong understanding of evolution, the central dogma of molecular biology, cell structure across the domains of life, population ecology, the metabolic strategies employed by marine organisms, and the biomarkers of life in the ocean. These biological concepts will be the foundation for understanding geochemical shifts as the earth was oxygenated, changes in inorganic nutrient pools with depth and location, nitrogen cycling, Southern Ocean silica leakage, the cryptic sulfur cycle, redox chemistry leveraged by organisms at hydrothermal vents, and the biological carbon pump.
Biological Oceanography and Biogeochemistry: 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: Earth and Planetary Science/Undergraduate

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

Biological Oceanography and Biogeochemistry: Read Less [-]

EPS 115 Stratigraphy and Earth History 4 Units

Terms offered: Spring 2022, Spring 2020, Spring 2018
Collecting, analyzing, and presenting stratigraphic data; dating and correlating sedimentary rocks; recognizing ancient environments and reconstructing Earth history; seismic and sequence stratigraphy; event stratigraphy and neocatastrophism; applications of stratigraphy to climate change, petroleum geology, and archaeology.
Stratigraphy and Earth History: Read More [+]
Rules & Requirements

Prerequisites: 50, 100A, 100B, or consent of instructor

Hours & Format

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

Additional Details

Subject/Course Level: Earth and Planetary Science/Undergraduate

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

Instructor: Alvarez

Formerly known as: Geology 115

Stratigraphy and Earth History: Read Less [-]

EPS 116 Structural Geology and Tectonics 3 Units

Terms offered: Fall 2022, Fall 2020, Spring 2019
Introduction to the geometry and mechanics of brittle and ductile geologic structures; their origins and genetic relation to stress fields and their use as kinematic indicators; case histories of selected regions to elucidate tectonic evolution in different plate tectonic settings. Laboratory exercises will focus on analysis of hand specimens and structural relations portrayed on geologic maps. Several trips to observe geologic structures in the field to supplement laboratory exercises.
Structural Geology and Tectonics: Read More [+]
Rules & Requirements

Prerequisites: 50

Hours & Format

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

Additional Details

Subject/Course Level: Earth and Planetary Science/Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

Instructor: Burgmann

Structural Geology and Tectonics: Read Less [-]

EPS 117 Geomorphology 4 Units

Terms offered: Fall 2024, Fall 2023, Fall 2022
Quantitative examination of landforms, runoff generation, weathering, mechanics of soil erosion by water and wind, mass wasting, glacial and periglacial processes and hillslope evolution.
Geomorphology: Read More [+]
Rules & Requirements

Prerequisites: Consent of instructor

Hours & Format

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

Additional Details

Subject/Course Level: Earth and Planetary Science/Undergraduate

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

Formerly known as: Geology 117

Geomorphology: Read Less [-]

EPS 118 Advanced Field Course 4 Units

Terms offered: Spring 2024, Spring 2022, Spring 2021
Advanced geological mapping, intensive field observation, and problem solving in the field areas selected by instructors. Includes preparation of final reports.
Advanced Field Course: Read More [+]

Rules & Requirements

Prerequisites: 50, 100A-100B, 101, or consent of instructor; 119 is strongly recommended

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 2 hours of discussion per week

Summer: 6 weeks - 7.5 hours of lecture and 5 hours of discussion per week

Additional Details

Subject/Course Level: Earth and Planetary Science/Undergraduate

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

Instructor: Brimhall

Formerly known as: Geology 118

Advanced Field Course: Read Less [-]

EPS 119 Geologic Field Studies 2 Units

Terms offered: Fall 2024, Fall 2023, Fall 2021
Two to four weekend field trips to localities of geological interest.
Geologic Field Studies: Read More [+]

Rules & Requirements

Prerequisites: 101 and consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 0 hours of fieldwork per week

Additional Details

Subject/Course Level: Earth and Planetary Science/Undergraduate

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

Formerly known as: Geology 119

Geologic Field Studies: Read Less [-]

EPS 122 Physics of the Earth and Planetary Interiors 3 Units

Terms offered: Spring 2024, Spring 2022, Spring 2020
Gravity field, density distribution, and internal seismic structure of the Earth and planets. Constitution, composition, temperature distribution, and energetics of the Earth's interior. The geomagnetic field and the geodynamo, and concepts in seismic imaging and geophysical fluid dynamics. This
course welcomes physics, computer science, engineering and applied maths majors.
Physics of the Earth and Planetary Interiors: Read More [+]

Rules & Requirements

Prerequisites: Physics 7A-B, Mathematics 53-54, or equivalent

Hours & Format

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

Additional Details

Subject/Course Level: Earth and Planetary Science/Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

Physics of the Earth and Planetary Interiors: Read Less [-]

EPS 124 Isotopic Geochemistry 4 Units

Terms offered: Spring 2023, Spring 2021, Spring 2019
An overview of the use of natural isotopic variations to study earth, planetary, and environmental problems. Topics include geochronology, cosmogenic isotope studies of surficial processes, radiocarbon and the carbon cycle, water isotopes in the water cycle, and radiogenic and stable isotope studies of planetary evolution, mantle dynamics, volcanoes, groundwater, and geothermal systems. The course begins with a short introduction to nuclear processes and includes simple mathematical models used in isotope geochemistry.
Isotopic Geochemistry: Read More [+]

Rules & Requirements

Prerequisites: Chemistry 1A-1B, Mathematics 1A-1B

Hours & Format

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

Additional Details

Subject/Course Level: Earth and Planetary Science/Undergraduate

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

Instructor: David Shuster

Isotopic Geochemistry: Read Less [-]

EPS 125 Stable Isotope Geochemistry 4 Units

Terms offered: Spring 2024, Spring 2022, Spring 2020
This course provides an introduction to the principles of stable isotope geochemistry and the application of these principles to problems in Earth and planetary science. This course provides a foundation for the physical, chemical, and biological processes that cause isotopes to fractionate in nature including the kinetic theory of gases, equilibrium thermodynamics, and the kinetics of chemical reactions. These principles will be applied to the study of problems related to the water cycle, paleoclimate, igneous petrology, biogeochemical cycles in the past and present, and planetary science.
Stable Isotope Geochemistry: 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: Earth and Planetary Science/Undergraduate

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

Instructor: Stolper

Stable Isotope Geochemistry: Read Less [-]

EPS C129 Biometeorology 3 Units

Terms offered: Fall 2024, Fall 2022, Fall 2020, Fall 2018
This course describes how the physical environment (light, wind, temperature, humidity) of plants and soil affects the physiological status of plants and how plants affect their physical environment. Using experimental data and theory, it examines physical, biological, and chemical processes affecting transfer of momentum, energy, and material (water, CO2, atmospheric trace gases) between vegetation and the atmosphere. Plant biometeorology instrumentation and measurements are also discussed.
Biometeorology: Read More [+]
Hours & Format

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

Additional Details

Subject/Course Level: Earth and Planetary Science/Undergraduate

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

Instructor: Baldocchi

Also listed as: ESPM C129

Biometeorology: Read Less [-]

EPS 130 Strong Motion Seismology 3 Units

Terms offered: Spring 2024, Spring 2023, Spring 2022
Generation of seismic waves. Synthetic accelerograms. Instrumentation to measure strong ground motion. Estimation of seismic motion at a site. Ground motion spectra. Influence of soils and geologic structures. Seismic risk mapping.
Strong Motion Seismology: Read More [+]
Rules & Requirements

Prerequisites: Mathematics 54, or equivalent and consent of instructor

Hours & Format

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

Additional Details

Subject/Course Level: Earth and Planetary Science/Undergraduate

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

Formerly known as: Geophysics 130

Strong Motion Seismology: Read Less [-]

EPS 131 Geochemistry 4 Units

Terms offered: Fall 2024, Fall 2023, Fall 2022
Chemical reactions in geological processes. Thermodynamic methods for predicting chemical equilibria in nature. Isotopic and chemical tracers of transport processes in the earth. Chemistry of the solid earth, oceans, and atmosphere.
Geochemistry: Read More [+]
Rules & Requirements

Prerequisites: 100A-100B, Chemistry 1A-1B

Hours & Format

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

Additional Details

Subject/Course Level: Earth and Planetary Science/Undergraduate

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

Instructor: David Shuster

Geochemistry: Read Less [-]

EPS 150 Case Studies in Earth Systems 2 Units

Terms offered: Fall 2024, Spring 2024, Fall 2023
Analysis and discussion of three research problems on the interactions of solid earth, hydrologic, chemical, and atmospheric processes. Emphasis is on the synthesis and application of the student's disciplinary knowledge to a new integrative problem in the earth sciences.
Case Studies in Earth Systems: Read More [+]
Rules & Requirements

Prerequisites: 50, senior standing or consent of instructor

Hours & Format

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

Additional Details

Subject/Course Level: Earth and Planetary Science/Undergraduate

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

Case Studies in Earth Systems: Read Less [-]

EPS C162 Planetary Astrophysics 4 Units

Terms offered: Spring 2024, Spring 2022, Fall 2020
Physics of planetary systems, both solar and extra-solar. Star and planet formation, radioactive dating, small-body dynamics and interaction of radiation with matter, tides, planetary interiors, atmospheres, and magnetospheres. High-quality oral presentations may be required in addition to problem sets and a final exam.
Planetary Astrophysics: Read More [+]
Rules & Requirements

Prerequisites: Mathematics 53, 54; Physics 7A-7B-7C

Hours & Format

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

Additional Details

Subject/Course Level: Earth and Planetary Science/Undergraduate

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

Instructors: Chiang, Dressing, Militzer

Also listed as: ASTRON C162

Planetary Astrophysics: Read Less [-]

EPS C178 Applied Geophysics 3 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020, Fall 2019
The theory and practice of geophysical methods for determining the subsurface distribution of physical rock and soil properties. Measurements of gravity and magnetic fields, electrical and electromagnetic fields, and seismic velocity are interpreted to map the subsurface distribution of density, magnetic susceptibility, electrical conductivity, and mechanical properties.
Applied Geophysics: Read More [+]
Hours & Format

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

Additional Details

Subject/Course Level: Earth and Planetary Science/Undergraduate

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

Instructor: Rector

Also listed as: CIV ENG C178

Applied Geophysics: Read Less [-]

EPS C180 Air Pollution 3 Units

Terms offered: Spring 2024, Spring 2023, Spring 2022
This course is an introduction to air pollution and the chemistry of earth's atmosphere. We will focus on the fundamental natural processes controlling trace gas and aerosol concentrations in the atmosphere, and how anthropogenic activity has affected those processes at the local, regional, and global scales. Specific topics include stratospheric ozone depletion, increasing concentrations of green house gasses, smog, and changes in the oxidation capacity of the troposphere.
Air Pollution: Read More [+]
Rules & Requirements

Prerequisites: CHEM 1A, CHEM 1B, and PHYSICS 8A or consent of instructor

Hours & Format

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

Additional Details

Subject/Course Level: Earth and Planetary Science/Undergraduate

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

Instructor: Goldstein

Also listed as: CIV ENG C106/ESPM C180

Air Pollution: Read Less [-]

EPS C181 Atmospheric Physics and Dynamics 3 Units

Terms offered: Fall 2024, Fall 2023, Fall 2022, Fall 2020, Fall 2019
This course examines the processes that determine the structure and circulation of the Earth's atmosphere. The approach is deductive rather than descriptive: to figure out the properties and behavior of the Earth's atmosphere based on the laws of physics and fluid dynamics. Topics will include interaction between radiation and atmospheric composition; the role of water in the energy and radiation balance; governing equations for atmospheric motion, mass conservation, and thermodynamic energy balance; geostrophic flow, quasigeostrophic motion, baroclinic instability and dynamics of extratropical cyclones.
Atmospheric Physics and Dynamics: Read More [+]
Rules & Requirements

Prerequisites: Mathematics 53, 54; Physics 7A-7B-7C

Hours & Format

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

Additional Details

Subject/Course Level: Earth and Planetary Science/Undergraduate

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

Instructors: Chiang, Fung

Also listed as: GEOG C139

Atmospheric Physics and Dynamics: Read Less [-]

EPS C182 Atmospheric Chemistry and Physics Laboratory 3 Units

Terms offered: Spring 2024, Spring 2023, Spring 2022
Fluid dynamics, radiative transfer, and the kinetics, spectroscopy, and measurement of atmospherically relevant species are explored through laboratory experiments, numerical simulations, and field observations.
Atmospheric Chemistry and Physics Laboratory: Read More [+]
Rules & Requirements

Prerequisites: Earth and Planetary Science 50 and 102 with grades of C- or higher (one of which may be taken concurrently) or two of the following: Chemistry 120A, 120B, C130, or 130B with grades of C- or higher (one of which may be taken concurrently)

Credit Restrictions: Deficiency in C182 may be removed by successfully completing 125. Consent of instructor is required to enroll in C182 after completing 125.

Hours & Format

Fall and/or spring: 15 weeks - 1.5 hours of lecture and 5 hours of laboratory per week

Additional Details

Subject/Course Level: Earth and Planetary Science/Undergraduate

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

Formerly known as: Chemistry C182/Earth and Planetary Science C182

Also listed as: CHEM C182

Atmospheric Chemistry and Physics Laboratory: Read Less [-]

EPS C183 Carbon Cycle Dynamics 3 Units

Terms offered: Fall 2024, Fall 2023, Fall 2021, Spring 2019
The focus is the (unsolved) puzzle of the contemporary carbon cycle. Why is the concentration of atmospheric CO2 changing at the rate observed? What are the terrestrial and oceanic processes that add and remove carbon from the atmosphere? What are the carbon management strategies under discussion? How can emission protocols be verified? Students are encouraged to gain hands-on experience with the available data, and learn modeling skills to evaluate hypotheses of carbon sources and sinks.
Carbon Cycle Dynamics: Read More [+]
Hours & Format

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

Additional Details

Subject/Course Level: Earth and Planetary Science/Undergraduate

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

Instructor: Fung

Also listed as: ESPM C170

Carbon Cycle Dynamics: Read Less [-]

EPS H195 Senior Honors Course 3 Units

Terms offered: Fall 2014, Spring 2013, Fall 2012
Original research and preparation of an acceptable thesis. May be taken during two consecutive semesters of senior year and may be substituted for six units of the upper division requirement with consent of major adviser.
Senior Honors Course: Read More [+]
Rules & Requirements

Prerequisites: Limited to honors candidates

Repeat rules: Course may be repeated for credit up to a total of 6 units.

Hours & Format

Fall and/or spring: 15 weeks - 0-0 hours of independent study per week

Summer:
6 weeks - 0-0 hours of independent study per week
8 weeks - 0-0 hours of independent study per week

Additional Details

Subject/Course Level: Earth and Planetary Science/Undergraduate

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

Senior Honors Course: Read Less [-]

EPS 197 Field Study 1 - 4 Units

Terms offered: Fall 2010
Written proposal signed by faculty sponsor and approved by major faculty advisor. Supervised experience relevant to specific aspects of students' EPS specialization in off-campus organization. Regular meetings with faculty sponsor and written report required.
Field Study: Read More [+]
Rules & Requirements

Prerequisites: Upper division standing and declared major in Earth and Planetary Science

Credit Restrictions: Enrollment is restricted; see the Introduction to Courses and Curricula section of this catalog.

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 3-12 hours of fieldwork per week

Summer:
6 weeks - 7.5-30 hours of fieldwork per week
8 weeks - 6-24 hours of fieldwork per week
10 weeks - 4.5-18 hours of fieldwork per week

Additional Details

Subject/Course Level: Earth and Planetary Science/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

Field Study: Read Less [-]

EPS 198 Directed Group Study 1 - 4 Units

Terms offered: Fall 2024, Spring 2024, Fall 2023
Group studies of selected topics which vary from semester to semester.
Directed Group Study: Read More [+]
Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of directed group study per week

Additional Details

Subject/Course Level: Earth and Planetary Science/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

Formerly known as: Geology 198

Directed Group Study: Read Less [-]

EPS 199 Supervised Independent Study and Research 1 - 4 Units

Terms offered: Fall 2020, Fall 2015, Spring 2015
Enrollment is restricted by regulations.
Supervised Independent Study and Research: Read More [+]
Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of independent study per week

Summer:
6 weeks - 2.5-10 hours of independent study per week
8 weeks - 1.5-7.5 hours of independent study per week

Additional Details

Subject/Course Level: Earth and Planetary Science/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

Formerly known as: Geology 199

Supervised Independent Study and Research: Read Less [-]

EPS 200 Problems in Hydrogeology 4 Units

Terms offered: Spring 2022, Spring 2021, Fall 2019
Current problems in fluid flow, heat flow, and solute transport in the earth. Pressure- and thermal-driven flow, instability, convection, interaction between fluid flow and chemical reactions. Pore pressure; faulting and earthquakes; diagenesis; hydrocarbon migration and trapping; flow-associated mineralization; contaminant problems.
Problems in Hydrogeology: Read More [+]
Rules & Requirements

Prerequisites: Physics 7A-7B, Chemistry 1A-1B, Math 53 and 54; open to senior undergraduates with appropriate prerequisites

Hours & Format

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

Additional Details

Subject/Course Level: Earth and Planetary Science/Graduate

Grading: Letter grade.

Formerly known as: Geophysics C200 and Geology C200

Problems in Hydrogeology: Read Less [-]

EPS 203 Introduction to Aquatic and Marine Geochemistry 4 Units

Terms offered: Spring 2023, Spring 2022, Spring 2021
Introduction to marine geochemistry: the global water cycle; processes governing the distribution of chemical species within the hydrosphere; ocean circulation; chemical mass balances, fluxes, and reactions in the marine environment from global to submicron scales; carbon system equilibrium chemistry and biogeochemistry of fresh and salt walter; applications of natural and anthropogenic stable and radioactive tracers; internal ocean processes. Students participate in a one day field trip to sample and analyze waters in the vicinity of Tomales Bay and Point Reyes. 3 hours of lecture and 1.5 hours of discussion week, and a 10 hour field trip.
Introduction to Aquatic and Marine Geochemistry: Read More [+]
Rules & Requirements

Prerequisites: Chemistry 1A, Mathematics 1A, or 16A. C82 recommended

Hours & Format

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

Additional Details

Subject/Course Level: Earth and Planetary Science/Graduate

Grading: Letter grade.

Instructor: Bishop

Introduction to Aquatic and Marine Geochemistry: Read Less [-]

EPS 204 Elastic Wave Propagation 3 Units

Terms offered: Fall 2012, Fall 2007, Fall 2004
Wave propagation in elastic solids; effects of anelasticity and anistropy; representation theorems; reflection and refraction; propagation in layered media; finite-difference and finite-element methods.
Elastic Wave Propagation: Read More [+]
Rules & Requirements

Prerequisites: 104 or equivalent; 121; Physics 105

Hours & Format

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

Additional Details

Subject/Course Level: Earth and Planetary Science/Graduate

Grading: Letter grade.

Formerly known as: Geophysics 204

Elastic Wave Propagation: Read Less [-]

EPS 207 Laboratory in Observational Seismology 3 Units

Terms offered: Fall 2024, Fall 2023, Spring 2022
Group problem solving of current seismological topics. Analysis, inversion, and numerical modeling of seismic waveform data to investigate questions regarding the physics of the earthquake source and seismic wave propagation. Application of current developments and techniques in seismological research.
Laboratory in Observational Seismology: Read More [+]
Rules & Requirements

Prerequisites: 121 or 130 or 204 or consent of instructor

Hours & Format

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

Additional Details

Subject/Course Level: Earth and Planetary Science/Graduate

Grading: Letter grade.

Formerly known as: Geophysics 207

Laboratory in Observational Seismology: Read Less [-]

EPS 209 Matlab Applications in Earth Science 2 Units

Terms offered: Spring 2011, Fall 2002
Introduction to Matlab programming with toolboxes. Applications come from Earth sciences and related fields including biology. Topics range from image processing, riverbed characterization, landslide risk analysis, signal processing, geospatial and seismic data analysis, and machine learning to parallel computation. Designed for beginning graduate students.
Matlab Applications in Earth Science: Read More [+]
Rules & Requirements

Prerequisites: Some programming experience in any language

Hours & Format

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

Additional Details

Subject/Course Level: Earth and Planetary Science/Graduate

Grading: Letter grade.

Matlab Applications in Earth Science: Read Less [-]

EPS 210 Exploration, Ore Petrology, and Geochemistry 4 Units

Terms offered: Fall 2012, Fall 2011, Spring 2010
Overview of geological, petrological, and geochemical analysis of ore forming processes including sedimentary, magmatic, hydrothermal, and geothermal resources. Geochemical rock buffers and hydrothermal phase equilibria. Electro-geochemistry of near surface oxidation of primary ores related to climate change, hydrological evolution, and tectonics. Exploration for earth materials for conventional and sustainable technologies including multiple junction semiconductor photo-voltaic cells. Mass balance modeling of ore-forming systems and soils. Environmental management of exploration sites. Lab includes macroscopic and X-ray identification of ore and alteration minerals and ore microscopy. Field trips use digital GIS mapping methods for rock type, structure, mineralization, and wall rock alteration. Integration interpretation of geophysics with geology.
Exploration, Ore Petrology, and Geochemistry: Read More [+]
Rules & Requirements

Prerequisites: 101 or 271; 100A-100B; 118 recommended

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

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

Additional Details

Subject/Course Level: Earth and Planetary Science/Graduate

Grading: Letter grade.

Instructor: Brimhall

Formerly known as: Geology 205

Exploration, Ore Petrology, and Geochemistry: Read Less [-]

EPS 212 Advanced Stratigraphy and Tectonics 3 Units

Terms offered: Spring 2011, Spring 2009, Spring 2008
Evolution of the earth in response to internal, surficial and extraterrestrial processes.
Advanced Stratigraphy and Tectonics: Read More [+]
Rules & Requirements

Prerequisites: Consent of instructor

Hours & Format

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

Additional Details

Subject/Course Level: Earth and Planetary Science/Graduate

Grading: Letter grade.

Formerly known as: Geology 212

Advanced Stratigraphy and Tectonics: Read Less [-]

EPS 214 Igneous Petrology 4 Units

Terms offered: Spring 2024, Spring 2020, Spring 2017
The composition, generation, and cooling of magmas to form igneous rocks. The physical and thermodynamic properties of silicate liquids.
Igneous Petrology: Read More [+]
Rules & Requirements

Prerequisites: Consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 4 hours of laboratory per week

Additional Details

Subject/Course Level: Earth and Planetary Science/Graduate

Grading: Letter grade.

Formerly known as: Geology 214

Igneous Petrology: Read Less [-]

EPS 216 Active Tectonics 3 Units

Terms offered: Fall 2024, Fall 2023, Fall 2021
This course is a graduate course designed to introduce students in the earth sciences to the geology of earthquakes, including tectonic geomorphology, paleoseismology and the analysis and interpretation of geodetic measurements of active deformation. While the focus will be primarily on seismically active faults, we will also discuss deformation associated with landslides, regional isostatic rebound, and volcanoes, as well as measurements of global plate motions. We will address methods and applications in paleoseismology, tectonic geomorphology, and geodesy. The course will address measurement techniques (e.g,. GPS, leveling, etc.), data analysis and inversion, and subsequent modeling and interpretation of the data. The integration of geodetic measurements with geologic and seismologic data allows an improved understanding of active processes.
Active Tectonics: Read More [+]
Rules & Requirements

Prerequisites: 116 or equivalent, Physics 7A or equivalent, or consent of instructor

Hours & Format

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

Additional Details

Subject/Course Level: Earth and Planetary Science/Graduate

Grading: Letter grade.

Formerly known as: Geology 207

Active Tectonics: Read Less [-]

EPS 217 Fluvial Geomorphology 4 Units

Terms offered: Spring 2020, Spring 2019, Spring 2018
Application of fluid mechanics to sediment transport and development of river morphology. Form and process in river meanders, the pool-riffle sequence, aggradation, grade, and baselevel.
Fluvial Geomorphology: Read More [+]
Rules & Requirements

Prerequisites: Consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 2 hours of laboratory per week

Additional Details

Subject/Course Level: Earth and Planetary Science/Graduate

Grading: Letter grade.

Formerly known as: Geology 217

Fluvial Geomorphology: Read Less [-]

EPS 220 Advanced Concepts in Mineral Physics 3 Units

Terms offered: Fall 2022, Fall 2021, Spring 2020
A combined seminar and lecture course covering advanced topics related to mineral physics. The interface between geophysics with the other physical sciences is emphasized. Topics vary each semester.
Advanced Concepts in Mineral Physics: Read More [+]
Rules & Requirements

Prerequisites: Consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

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

Additional Details

Subject/Course Level: Earth and Planetary Science/Graduate

Grading: Letter grade.

Formerly known as: Geophysics 220

Advanced Concepts in Mineral Physics: Read Less [-]

EPS 224 Isotopic Geochemistry 4 Units

Terms offered: Spring 2024, Spring 2023, Spring 2021
An overview of the use of natural isotopic variations to study earth, planetary, and environmental problems. Topics include geochronology, cosmogenic isotope studies of surficial processes, radiocarbon and the carbon cycle, water isotopes in the water cycle, and radiogenic and stable isotope studies of planetary evolution, mantle dynamics, volcanoes, groundwater, and geothermal systems. The course begins with a short introduction to nuclear processes and includes simple mathematical models used in isotope geochemistry.
Isotopic Geochemistry: Read More [+]

Rules & Requirements

Prerequisites: Chemistry 1A-1B, Mathematics 1A-1B

Hours & Format

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

Additional Details

Subject/Course Level: Earth and Planetary Science/Graduate

Grading: Letter grade.

Instructor: David Shuster

Isotopic Geochemistry: Read Less [-]

EPS 225 Topics in High-Pressure Research 2 Units

Terms offered: Spring 2023, Spring 2022, Fall 2021
Analysis of current developments and techniques in experimental and theoretical high-pressure research, with applications in the physical sciences. Topics vary each semester.
Topics in High-Pressure Research: Read More [+]

Rules & Requirements

Prerequisites: Consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

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

Additional Details

Subject/Course Level: Earth and Planetary Science/Graduate

Grading: Letter grade.

Formerly known as: Geophyics 225

Topics in High-Pressure Research: Read Less [-]

EPS 229 Introduction to Climate Modeling 3 Units

Terms offered: Fall 2022, Spring 2021, Spring 2018
This course emphasizes the fundamentals of the climate system via a hierarchy of climate models. Topics will include energy balance, numerical techniques, climate observations, atmospheric and oceanic circulation and heat transports, and parameterizations of eddy processes. The model hierarchy will also explore nonlinear and stochastic processes, and biogeochemistry. Students will build computational models to investigate climate feedbacks, climate sensitivity, and response times.
Introduction to Climate Modeling: Read More [+]

Rules & Requirements

Repeat rules: Course may be repeated for credit with instructor consent.

Hours & Format

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

Additional Details

Subject/Course Level: Earth and Planetary Science/Graduate

Grading: Letter grade.

Instructor: Fung

Formerly known as: Earth and Planetary Science C229/Integrative Biology C229

Introduction to Climate Modeling: Read Less [-]

EPS 230 Radiation and Its Interactions with Climate 3 Units

Terms offered: Fall 2024, Fall 2023, Fall 2021
Introduction to role of radiative processes in structure and evolution of the climate system. Electromagnetism; solar and terrestrial radiation; interactions of radiation with Earth's atmosphere, ocean, and land surface; greenhouse and runaway greenhouse effects; radiative balance of the climate system; energy-balance climate models; effects of clouds and aerosols; interactions of radiation with atmospheric and oceanic dynamics; radiative processes and paleoclimate; radiative processes and anthropogenic global warming.
Radiation and Its Interactions with Climate: Read More [+]

Rules & Requirements

Prerequisites: Physics 105, 110A, 110B

Hours & Format

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

Additional Details

Subject/Course Level: Earth and Planetary Science/Graduate

Grading: Letter grade.

Instructor: Collins

Radiation and Its Interactions with Climate: Read Less [-]

EPS 236 Geological Fluid Mechanics 4 Units

Terms offered: Fall 2024, Fall 2023, Fall 2022
An advanced course in the application of fluid mechanics in the earth sciences, with emphasis on the design and scaling of laboratory and numerical models. Principals of inviscid and viscous fluid flow; dynamic similarity; boundary layers; convection; instabilities; gravity currents; mixing and chaos; porous flow. Applications to mantle convection, magma dynamics, atmosphere and ocean dynamics, sediment/debris flows, and hydrogeology. Topics may vary from year to year.
Geological Fluid Mechanics: Read More [+]
Rules & Requirements

Prerequisites: Continuum/fluid mechanics at the level of 108 or consent of instructor

Hours & Format

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

Additional Details

Subject/Course Level: Earth and Planetary Science/Graduate

Grading: Letter grade.

Formerly known as: Geophysics 238

Geological Fluid Mechanics: Read Less [-]

EPS C241 Stable Isotope Ecology 5 Units

Terms offered: Spring 2024, Spring 2023, Spring 2022, Spring 2021, Spring 2020, Spring 2019, Spring 2016
Course focuses on principles and applications of stable isotope chemistry as applied to the broad science of ecology. Lecture topics include principles of isotope behavior and chemistry, and isotope measurements in the context of terrestrial, aquatic, and marine ecological processes and problems. Students participate in a set of laboratory exercises involving preparation of samples of choice for isotopic analyses, the use of the mass spectrometer and optical analysis systems, and the anlaysis of data.
Stable Isotope Ecology: Read More [+]
Rules & Requirements

Prerequisites: Graduate standing

Hours & Format

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

Additional Details

Subject/Course Level: Earth and Planetary Science/Graduate

Grading: Letter grade.

Instructors: Amundson, Dawson, Mambelli

Also listed as: ESPM C220/INTEGBI C227

Stable Isotope Ecology: Read Less [-]

EPS C242 Glaciology 4 Units

Terms offered: Spring 2024, Spring 2021, Spring 2020, Spring 2018
A review of the mechanics of glacial systems, including formation of ice masses, glacial flow mechanisms, subglacial hydrology, temperature and heat transport, global flow, and response of ice sheets and glaciers. We will use this knowledge to examine glaciers as geomorphologic agents and as participants in climate change.
Glaciology: Read More [+]
Rules & Requirements

Prerequisites: Graduate standing or consent of instructor

Hours & Format

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

Additional Details

Subject/Course Level: Earth and Planetary Science/Graduate

Grading: Letter grade.

Instructor: Cuffey

Formerly known as: 241

Also listed as: GEOG C241

Glaciology: Read Less [-]

EPS C249 Solar System Astrophysics 3 Units

Terms offered: Fall 2019, Fall 2018, Fall 2017
The physical foundations of planetary sciences. Topics include planetary interiors and surfaces, planetary atmospheres and magnetospheres, and smaller bodies in our solar system. The physical processes at work are developed in some detail, and an evolutionary picture for our solar system, and each class of objects, is developed. Some discussion of other (potential) planetary systems is also included.
Solar System Astrophysics: Read More [+]
Rules & Requirements

Prerequisites: 149, 169, C160A or consent of instructor

Hours & Format

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

Additional Details

Subject/Course Level: Earth and Planetary Science/Graduate

Grading: Letter grade.

Instructors: Chiang, de Pater

Also listed as: ASTRON C249

Solar System Astrophysics: Read Less [-]

EPS 250 Advanced Topics in Earth and Environmental Sciences 3 Units

Terms offered: Fall 2016, Fall 2014, Fall 2013
Review of recent literature and discussion of ongoing research at the interface between earth science and environmental science.
Advanced Topics in Earth and Environmental Sciences: Read More [+]
Rules & Requirements

Prerequisites: Consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

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

Additional Details

Subject/Course Level: Earth and Planetary Science/Graduate

Grading: Letter grade.

Formerly known as: Geology 250

Advanced Topics in Earth and Environmental Sciences: Read Less [-]

EPS 251 Carbon Cycle Dynamics 3 Units

Terms offered: Fall 2024, Fall 2023, Fall 2021
In this course, we will focus on the (unsolved) puzzle of the contemporary carbon cycle. Why is the concentration of atmospheric CO2 changing at the rate observed? What are the terrestrial and oceanic processes that add and remove carbon from the atmosphere? What are the processes responsible for long-term storage of carbon on land and in the sea? Emphasis will be placed on the observations and modeling needed to evaluate hypotheses about carbon sources and sinks. Past records will be examined for clues about sensitivity of carbon processes to climate variations.
Carbon Cycle Dynamics: Read More [+]
Hours & Format

Fall and/or spring: 15 weeks - 6 hours of lecture per week

Additional Details

Subject/Course Level: Earth and Planetary Science/Graduate

Grading: Letter grade.

Formerly known as: Geology 219

Carbon Cycle Dynamics: Read Less [-]

EPS 254 Advanced Topics in Seismology and Geophysics 1 Unit

Terms offered: Fall 2024, Spring 2024, Fall 2023
Lectures on various topics representing current advances in seismology and geophysics, including local crustal and earthquake studies, regional tectonics, structure of the earth's mantle, and core and global dynamics.
Advanced Topics in Seismology and Geophysics: Read More [+]
Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

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

Additional Details

Subject/Course Level: Earth and Planetary Science/Graduate

Grading: Letter grade.

Formerly known as: Geophysics 250

Advanced Topics in Seismology and Geophysics: Read Less [-]

EPS 255 Advanced Topics in Earth and Planetary Science 1 Unit

Terms offered: Fall 2024, Spring 2024, Fall 2023
Lectures on various topics representing current advances in all aspects of earth and planetary science.
Advanced Topics in Earth and Planetary Science: Read More [+]
Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1.5 hours of colloquium per week

Additional Details

Subject/Course Level: Earth and Planetary Science/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Advanced Topics in Earth and Planetary Science: Read Less [-]

EPS 256 Earthquake of the Week 2 Units

Terms offered: Fall 2024, Spring 2024, Fall 2023
Each week, the seismicity of the previous week, in California and worldwide, is reviewed. Tectonics of the region as well as source parameters and waveforms of interest are discussed and placed in the context of ongoing research in seismology.
Earthquake of the Week: Read More [+]

Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

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

Additional Details

Subject/Course Level: Earth and Planetary Science/Graduate

Grading: Letter grade.

Formerly known as: Geophysics 255

Earthquake of the Week: Read Less [-]

EPS 260 Research in Earth Science 2 Units

Terms offered: Fall 2024, Fall 2023, Fall 2022
Weekly presentations to introduce new graduate students and senior undergraduates to current research conducted in the Department of Earth and Planetary Science.
Research in Earth Science: Read More [+]

Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

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

Additional Details

Subject/Course Level: Earth and Planetary Science/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Formerly known as: Geology 260

Research in Earth Science: Read Less [-]

EPS 271 Field Geology and Digital Mapping 4 Units

Terms offered: Fall 2024, Fall 2023, Fall 2022
Geological mapping, field observation, and problem solving in the Berkeley hills and environs leading to original interpretation of geological processes and history from stratigraphic, structural, and lithological investigations. Integration of the Berkeley hills geology into the tectonic and paleo-climatic record of the Coast Ranges and California as a whole through systematic field mapping in key localities and reading of original literature. Training in digital field mapping, use of digital base maps, and use of global positioning systems.
Field Geology and Digital Mapping: Read More [+]

Rules & Requirements

Prerequisites: 50 or equivalent introductory course for majors

Credit Restrictions: Students will receive no credit for 271 after taking 101.

Hours & Format

Fall and/or spring: 15 weeks - 7 hours of fieldwork and 2 hours of lecture per week

Additional Details

Subject/Course Level: Earth and Planetary Science/Graduate

Grading: Letter grade.

Instructor: Brimhall

Field Geology and Digital Mapping: Read Less [-]

EPS C276 Seismic Hazard Analysis and Design Ground Motions 3 Units

Terms offered: Spring 2023, Spring 2021, Spring 2019
Deterministic and probabilistic approaches for seismic hazard analysis. Separation of uncertainty into aleatory variability and epistemic uncertainty. Discussion of seismic source and ground motion characterization and hazard computation. Development of time histories for dynamic analyses of structures and seismic risk computation, including selection of ground motion parameters for estimating structural response, development of fragility curves, and methods for risk calculations.
Seismic Hazard Analysis and Design Ground Motions: 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: Earth and Planetary Science/Graduate

Grading: Letter grade.

Instructor: Abrahamson

Also listed as: CIV ENG C276

Seismic Hazard Analysis and Design Ground Motions: Read Less [-]

EPS 280 Research 1 - 12 Units

Terms offered: Fall 2024, Spring 2024, Fall 2023
Individual conferences to be arranged. Provides supervision in the preparation of an original research paper or dissertation.
Research: Read More [+]
Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1-12 hours of independent study per week

Summer:
6 weeks - 3-30 hours of independent study per week
8 weeks - 2-23 hours of independent study per week
10 weeks - 2-18 hours of independent study per week

Additional Details

Subject/Course Level: Earth and Planetary Science/Graduate

Grading: Letter grade.

Research: Read Less [-]

EPS 290 Seminar 1 - 6 Units

Terms offered: Fall 2024, Spring 2024, Fall 2023
Topics will be announced each semester.
Seminar: Read More [+]
Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 2-6 hours of lecture per week

Additional Details

Subject/Course Level: Earth and Planetary Science/Graduate

Grading: Letter grade.

Formerly known as: Geology 290

Seminar: Read Less [-]

EPS C292 Planetary Science Seminar 1 Unit

Terms offered: Fall 2024, Spring 2024, Fall 2023
The departments of Astronomy and Earth and Planetary Science offer a joint research seminar in advanced topics in planetary science, featuring speakers drawn from graduate students, postdoctoral researchers, faculty, and visiting scholars. Topics will span planetary interiors; surface morphology; atmospheres; dynamics; planet formation; and astrobiology. Speakers will vary from semester to semester. Meetings will be held once a week for 1 hour each, and the schedule of speakers will be determined on the first day of class. To pass the class, participants will be required to give a 30-minute presentation, either on their own research or on recent results from the literature.
Planetary Science Seminar: Read More [+]
Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

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

Additional Details

Subject/Course Level: Earth and Planetary Science/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Also listed as: ASTRON C292

Planetary Science Seminar: Read Less [-]

EPS C295Z Energy Solutions: Carbon Capture and Sequestration 3 Units

Terms offered: Fall 2018, Spring 2017, Spring 2015, Spring 2014, Spring 2013
After a brief overview of the chemistry of carbon dioxide in the land, ocean, and atmosphere, the course will survey the capture and sequestration of CO2 from anthropogenic sources. Emphasis will be placed on the integration of materials synthesis and unit operation design, including the chemistry and engineering aspects of sequestration. The course primarily addresses scientific and engineering challenges and aims to engage students in state-of-the-art research in global energy challenges.
Energy Solutions: Carbon Capture and Sequestration: Read More [+]
Rules & Requirements

Prerequisites: Chemistry 4B or 1B, Mathematics 1B, and Physics 7B, or equivalents

Hours & Format

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

Additional Details

Subject/Course Level: Earth and Planetary Science/Graduate

Grading: Letter grade.

Instructors: Bourg, DePaolo, Long, Reimer, Smit

Also listed as: CHEM C236/CHM ENG C295Z

Energy Solutions: Carbon Capture and Sequestration: Read Less [-]

EPS 298 Directed Group Study for Graduates 1 - 9 Units

Terms offered: Fall 2024, Fall 2023, Fall 2022
Directed Group Study for Graduates: Read More [+]
Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 0 hours of independent study per week

Additional Details

Subject/Course Level: Earth and Planetary Science/Graduate

Grading: The grading option will be decided by the instructor when the class is offered.

Formerly known as: Geology 298

Directed Group Study for Graduates: Read Less [-]

EPS C301 Communicating Ocean Science 4 Units

Terms offered: Spring 2021, Spring 2020, Spring 2019, Spring 2015, Fall 2014, Spring 2014, Spring 2013
For graduate students interested in improving their ability to communicate their scientific knowledge by teaching ocean science in elementary schools or science centers/aquariums. The course will combine instruction in inquiry-based teaching methods and learning pedagogy with six weeks of supervised teaching experience in a local school classroom or the Lawrence Hall of Science with a partner. Thus, students will practice communicating scientific knowledge and receive mentoring on how to improve their presentations.
Communicating Ocean Science: Read More [+]
Rules & Requirements

Prerequisites: One course in introductory biology, geology, chemistry, physics, or marine science required and interest in ocean science,junior, senior, or graduate standing; consent of instructor required for sophomores

Hours & Format

Fall and/or spring: 15 weeks - 2.5 hours of lecture, 1 hour of discussion, and 2 hours of fieldwork per week

Additional Details

Subject/Course Level: Earth and Planetary Science/Professional course for teachers or prospective teachers

Grading: Letter grade.

Instructor: Ingram

Also listed as: GEOG C301/INTEGBI C215

Communicating Ocean Science: Read Less [-]

EPS 375 Professional Preparation: Supervised Teaching of Geology and Geophysics 1 - 6 Units

Terms offered: Fall 2021, Fall 2020, Fall 2019
Discussion, curriculum, class observation, and practice teaching in geology, geophysics, and earth science.
Professional Preparation: Supervised Teaching of Geology and Geophysics: Read More [+]
Rules & Requirements

Prerequisites: Graduate standing and appointment as graduate student instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

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

Additional Details

Subject/Course Level: Earth and Planetary Science/Professional course for teachers or prospective teachers

Grading: Offered for satisfactory/unsatisfactory grade only.

Formerly known as: Earth and Planetary Science 300

Professional Preparation: Supervised Teaching of Geology and Geophysics: Read Less [-]