Marine Science

Bachelor of Arts (BA)

The ocean plays a central role in physical, biological, chemical, and geological processes on Earth. The field of marine science thus requires an understanding of the interactions between the biosphere, hydrosphere, lithosphere, and atmosphere. Some examples of the current research directions of societal concern in the marine sciences include: the role of the ocean in climate change, the ocean's role in climate phenomena such as El Niño and La Niña (and their effect on modern marine ecosystems), the history of El Niño and other climatic/oceanographic events recorded in marine sediments and corals, coastal pollution and its effect on coastal marine ecosystems, and coastal erosion (natural and human-caused).

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 grade point average (GPA) of at least 3.3 in all courses in the major and an overall GPA of at least 3.3 in the University; and 2) carry out an individual research or study project, involving at least three units of EPS H195. The project is chosen in consultation with a departmental advisor, and a 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 Marine Science faculty adviser.

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

Atmospheric Science (https://guide.berkeley.edu/undergraduate/degree-programs/atmospheric-science/): BA, Minor
Climate Science (https://guide.berkeley.edu/undergraduate/degree-programs/climate-science/): Minor
Earth and Planetary Science (https://guide.berkeley.edu/undergraduate/degree-programs/earth-planetary-science/): Minor
Environmental Earth Science (https://guide.berkeley.edu/undergraduate/degree-programs/environmental-earth-science/): BA, Minor
Geology (https://guide.berkeley.edu/undergraduate/degree-programs/geology/): BA, Minor
Geophysics (https://guide.berkeley.edu/undergraduate/degree-programs/geophysics/): BA, Minor
Planetary Science (https://guide.berkeley.edu/undergraduate/degree-programs/planetary-science/): BA, 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 & EPS 82	The Planet Earth and Oceans	7
or EPS N82	Introduction to Oceans	
CHEM 1A & 1AL	General Chemistry and General Chemistry Laboratory	5
or CHEM 4A	General Chemistry and Quantitative Analysis	
BIOLOGY 1B	General Biology Lecture and Laboratory	4
Choose one of the following math sequences:		
MATH 51 & MATH 52	Calculus I and Calculus II (MATH 51 and 52 as of Fall 2025 - previously MATH 1A and MATH 1B)	
MATH 10A & MATH 10B	Methods of Mathematics: Calculus, Statistics, and Combinatorics and Methods of Mathematics: Calculus, Statistics, and Combinatorics	
MATH 16A & MATH 16B	Analytic Geometry and Calculus and Analytic Geometry and Calculus	
Choose one of the following physics sequences:		
PHYSICS 5A & PHYSICS 5B & PHYSICS 5BL	Introductory Mechanics and Relativity and Introductory Electromagnetism, Waves, and Optics and Introduction to Experimental Physics I	
PHYSICS 7A & PHYSICS 7B	Physics for Scientists and Engineers and Physics for Scientists and Engineers	
PHYSICS 8A & PHYSICS 8B	Introductory Physics and Introductory Physics	

Upper Division Requirements

EPS 102	History and Evolution of Planet Earth	4
EPS 150	Case Studies in Earth Systems (Can only be taken senior year)	2

Electives

Select a total of 24 units. At least 12 out of the 24 units must be EPS courses.

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.

EPS C100	Communicating Ocean Science	4
EPS 100A	Minerals: Their Constitution and Origin	4
EPS 100B	Genesis and Interpretation of Rocks	4
EPS 103	Introduction to Aquatic and Marine Geochemistry	4
EPS 109	Computer Simulations with Jupyter Notebooks	4
EPS 113	Biological Oceanography and Biogeochemistry	4
EPS 117	Geomorphology	4
EPS 124	Isotopic Geochemistry	4
EPS 125	Stable Isotope Geochemistry	4
EPS C129	Biometeorology	3
EPS 131	Geochemistry	4
EPS C183	Carbon Cycle Dynamics	3
INTEGBI 103LF	Invertebrate Zoology with Laboratory	5
INTEGBI 104LF	Natural History of the Vertebrates with Laboratory	5
INTEGBI 108	Marine Biology	4
INTEGBI 113L	Paleobiological Perspectives on Ecology and Evolution	4
INTEGBI 118	Organismal Microbiomes and Host-Pathogen Interactions	4
INTEGBI 120	Introduction to Quantitative Methods In Biology	4
INTEGBI 152	Course Not Available	4
INTEGBI C153	Ecology	3
INTEGBI 158LF	Course Not Available (Will count towards 8 upper-division elective units.)	15
INTEGBI 159	The Living Planet: Impact of the Biosphere on the Earth System	3
INTEGBI C171	Freshwater Ecology	3
INTEGBI C160	Evolution	4
INTEGBI C176L	Course Not Available	3
INTEGBI 177LF	Ichthyology: An Introduction to the Scientific Process Through Research on Fishes	4
INTEGBI 230	Marine Ecosystems and Global Change (Advanced undergraduates welcome)	1
PB HLTH 142	Introduction to Probability and Statistics in Biology and Public Health	4
PLANTBI C192	Molecular Approaches to Environmental Problem Solving	2
PLANTBI 120	Biology of Algae	2
PLANTBI 120L	Laboratory for Biology of Algae	2
ESPM 108B	Environmental Change Genetics	3
ESPM 152	Global Change Biology	3
ESPM 102D	Climate and Energy Policy	4
GEOG 129	Ocean Worlds	3
GEOG 142	Global Climate Variability and Change	4
GEOG 143	Global Change Biogeochemistry	3
DATA C131A	Statistical Methods for Data Science	4
STAT C100	Principles & Techniques of Data Science	4
STAT 133	Concepts in Computing with Data	3
STAT 153	Introduction to Time Series	4
MEC ENG 160	Ocean Engineering Seminar	2
MEC ENG 168	Mechanics of Offshore Systems	3
MEC ENG 266	Geophysical and Astrophysical Fluid Dynamics (Instructor must approve undergraduate enrollment)	3
CIV ENG 100	Elementary Fluid Mechanics	4
CIV ENG 111	Environmental Engineering	3
CIV ENG 115	Water Chemistry	3
CIV ENG 200A	Environmental Fluid Mechanics I	3
CIV ENG 210	Control of Water-Related Pathogens	3
CIV ENG 211A	Water Quality Engineering	3

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 no later than one semester before a student's Expected Graduation Term (EGT). If the semester before EGT is fall or spring, the deadline is the last day of RRR week. If the semester before EGT is summer, the deadline is the final Friday of Summer Sessions. To declare a minor, contact the department advisor for information on requirements, and the declaration process.
2. All courses taken to fulfill the minor requirements below must be taken for graded credit.
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 for courses used 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.)

Lower Division Requirements

Lower Division		
EPS 82	Oceans	3
or EPS N82	Introduction to Oceans	

Upper Division

Select a minimum of five of the following (two must be EPS courses):

EPS C100	Communicating Ocean Science	4
EPS 100A	Minerals: Their Constitution and Origin	4
EPS 100B	Genesis and Interpretation of Rocks	4

EPS 102	History and Evolution of Planet Earth	4
EPS 103	Introduction to Aquatic and Marine Geochemistry	4
EPS 109	Computer Simulations with Jupyter Notebooks	4
EPS 113	Biological Oceanography and Biogeochemistry	4
EPS 117	Geomorphology	4
EPS 124	Isotopic Geochemistry	4
EPS 125	Stable Isotope Geochemistry	4
EPS C129	Biometeorology	3
EPS 131	Geochemistry	4
EPS C183	Carbon Cycle Dynamics	3
INTEGBI 103LF	Invertebrate Zoology with Laboratory	5
INTEGBI 104LF	Natural History of the Vertebrates with Laboratory	5
INTEGBI 108	Marine Biology	4
INTEGBI 113L	Paleobiological Perspectives on Ecology and Evolution	4
INTEGBI 118	Organismal Microbiomes and Host-Pathogen Interactions	4
INTEGBI 120	Introduction to Quantitative Methods In Biology	4
INTEGBI 152	Course Not Available	4
INTEGBI C153	Ecology	3
INTEGBI 158LF	Course Not Available	13
INTEGBI 159	The Living Planet: Impact of the Biosphere on the Earth System	3
INTEGBI 160	Course Not Available	4
INTEGBI C171	Freshwater Ecology	3
INTEGBI C176L	Course Not Available	3
INTEGBI 177LF	Ichthyology: An Introduction to the Scientific Process Through Research on Fishes	4
INTEGBI 230	Marine Ecosystems and Global Change (Advanced undergraduates welcome)	1
PB HLTH 142	Introduction to Probability and Statistics in Biology and Public Health	4
PLANTBI C140	Course Not Available	
PLANTBI C192	Molecular Approaches to Environmental Problem Solving	2
PLANTBI 120	Biology of Algae	2
PLANTBI 120L	Laboratory for Biology of Algae	2
ESPM 108B	Environmental Change Genetics	3
ESPM 152	Global Change Biology	3
ESPM 102D	Climate and Energy Policy	4
GEOG 129	Ocean Worlds	3
GEOG 142	Global Climate Variability and Change	4
GEOG 143	Global Change Biogeochemistry	3
DATA C131A	Statistical Methods for Data Science	4
STAT C100	Principles & Techniques of Data Science	4
STAT 133	Concepts in Computing with Data	3
STAT 153	Introduction to Time Series	4
MEC ENG 160	Ocean Engineering Seminar	2
MEC ENG 168	Mechanics of Offshore Systems	3
MEC ENG 266	Geophysical and Astrophysical Fluid Dynamics (Instructor must approve undergraduate enrollment)	3
CIV ENG 100	Elementary Fluid Mechanics	4
CIV ENG 111	Environmental Engineering	3
CIV ENG 115	Water Chemistry	3
CIV ENG 200A	Environmental Fluid Mechanics I	3
CIV ENG 210	Control of Water-Related Pathogens	3
CIV ENG 211A	Water Quality Engineering	3

Undergraduate students must fulfill the following requirements in addition to those required by their major program.

For a detailed lists of L&S requirements, please see Overview tab to the right in this guide or visit the L&S Degree Requirements (https://lsadvising.berkeley.edu/degree-requirements/) webpage. For College advising appointments, please visit the L&S Advising (https://lsadvising.berkeley.edu/home/) Pages.

University of California Requirements

Entry Level Writing

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 and must be taken for a letter grade.

American History and American Institutions

The American History and American Institutions requirements are based on the principle that all U.S. residents who have graduated from an American university should have an understanding of the history and governmental institutions of the United States.

Berkeley Campus Requirement

American Cultures

All undergraduate students at Cal need to take and pass this campus requirement 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 are plentiful and offer students opportunities to be part of research-led, highly accomplished teaching environments, grappling with the complexity of American Culture.

College of Letters & Science Essential Skills Requirements

Quantitative Reasoning

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

Foreign Language

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

Reading and Composition

In order to provide a solid foundation in reading, writing, and critical thinking the College of Letters and Science 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 for a letter grade.

College of Letters & Science 7 Course Breadth Requirements

Breadth Requirements

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

Unit Requirements

- 120 total units
- Of the 120 units, 36 must be upper division units
- Of the 36 upper division units, 6 must be taken in courses offered outside your major department

Residence Requirements

For units to be considered in "residence," you must be registered in courses on the Berkeley campus as a student in the College of Letters & Science. Most students automatically fulfill the residence requirement by attending classes at Cal for four years, or two years for transfer students. In general, there is no need to be concerned about this requirement, unless you graduate early, 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 L&S College 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 B.A. 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 Marine Science 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

Marine Science 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 for those who choose paths in new fields.

The Marine Science track is a good foundation for graduate study in the marine, geological or biological sciences or for technical positions in State and Federal agencies (such as NASA or NOAA) or private consulting firms.

Marine science is inherently interdisciplinary. Since the ocean plays a central role in physical, biological, chemical, and geological processes on Earth, an understanding of the interactions between the biosphere, hydrosphere, lithosphere, and atmosphere are crucial.

Major maps are experience maps that help undergraduates plan their Berkeley journey based on intended major or field of interest. Featuring student opportunities and resources from your college and department as well as across campus, each map includes curated suggestions for planning your studies, engaging outside the classroom, and pursuing your career goals in a timeline format.

Use the major map below to explore potential paths and design your own unique undergraduate experience:

View the Marine Science Major Map.

Undergraduate Student Services

Anna Atkinson, Undergraduate Major Advisor
epsua@berkeley.edu

Faculty Advisor

Professor Bethanie Edwards (http://eps.berkeley.edu/people/bethanie-edwards/)
bethanie_edwards@berkeley.edu

EPS Undergraduate Appointments

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

Marine Science

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.

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.

EPS 7 Introduction to Climate Change 3 Units

Terms offered: Fall 2025, Summer 2025 First 6 Week Session, Fall 2024

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.

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

EPS 10 Earth's Greatest Volcanic Eruptions 3 Units

Terms offered: Summer 2025 Second 6 Week Session

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.

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

EPS C12 The Planets 3 Units

Terms offered: Spring 2025, Spring 2024, Spring 2023

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.

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

EPS W12 The Planets 3 Units

Terms offered: Summer 2025 8 Week Session, Summer 2024 8 Week Session, Summer 2023 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.
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

EPS 20 Earthquakes in Your Backyard 3 Units

Terms offered: Summer 2025 First 6 Week Session, Summer 2025 Second 6 Week Session, Summer 2024 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.
Rules & Requirements

Credit Restrictions: Students will receive no credit for EPS 20 after completing GEOPHYS 20, or EPS C20. A deficient grade in EPS 20 may be removed by taking EPS C20.

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

EPS C20 Earthquakes in Your Backyard 3 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024, Spring 2024
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.
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

EPS 24 Freshman Seminar in Earth and Planetary Sciences 1 Unit

Terms offered: Spring 2025, 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.
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

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.

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

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.

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

EPS 50 The Planet Earth 4 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
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.

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

EPS 80 Environmental Earth Sciences 3 Units

Terms offered: Fall 2025, Summer 2025 Second 6 Week Session, Fall 2024
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.

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.

EPS 81 Extreme Weather and Climate 3 Units

Terms offered: Spring 2025, Spring 2024, Spring 2023
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.
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

EPS 82 Oceans 3 Units

Terms offered: Fall 2025, Fall 2024, Fall 2023
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.
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
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.

Instructor: Edwards

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

EPS N82 Introduction to Oceans 3 Units

Terms offered: Summer 2025 First 6 Week Session, Summer 2025 Second 6 Week Session, Summer 2024 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.
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.

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.
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.

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

Terms offered: Spring 2025, Fall 2024, Fall 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.

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

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.

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

EPS 100A Minerals: Their Constitution and Origin 4 Units

Terms offered: Fall 2025, Fall 2024, Fall 2023
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.

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

EPS 100B Genesis and Interpretation of Rocks 4 Units

Terms offered: Spring 2025, Spring 2024, Spring 2023
Introduction to the principal geologic environments where rocks are formed and displayed. Igneous, sedimentary, and metamorphic processes discussed in the context of global tectonics.

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

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.

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

EPS 101 Field Geology and Digital Mapping 4 Units

Terms offered: Fall 2025, Fall 2024, Fall 2023
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.

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

EPS 102 History and Evolution of Planet Earth 4 Units

Terms offered: Fall 2025, Fall 2024, Fall 2023
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.

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.

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.

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

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.

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

EPS 108 Geodynamics 4 Units

Terms offered: Spring 2025, Spring 2023, Spring 2021
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.

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.

EPS 109 Computer Simulations with Jupyter Notebooks 4 Units

Terms offered: Fall 2025, 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.

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.

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.

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.

EPS 114 Volcanology 4 Units

Terms offered: Not yet offered
The composition, generation, and cooling of magmas to form igneous rocks. The physical and thermodynamic properties of silicate liquids.
Rules & Requirements

Credit Restrictions: Students will receive no credit for EPS 114 after completing EPS 214. A deficient grade in EPS 114 may be removed by taking EPS 214.

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/Undergraduate

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

Instructor: Wieser

EPS 115 Stratigraphy and Earth History 4 Units

Terms offered: Spring 2025, Spring 2022, Spring 2020
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.
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

EPS 116 Structural Geology and Tectonics 3 Units

Terms offered: Fall 2024, Fall 2022, Fall 2020
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.
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

EPS 117 Geomorphology 4 Units

Terms offered: Fall 2025, Fall 2024, Fall 2023
Quantitative examination of landforms, runoff generation, weathering, mechanics of soil erosion by water and wind, mass wasting, glacial and periglacial processes and hillslope evolution.
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

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.

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

EPS 119 Geologic Field Studies 2 Units

Terms offered: Spring 2025, Fall 2023, Fall 2021
Two to four weekend field trips to localities of geological interest.

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

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.

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.

EPS 124 Isotopic Geochemistry 4 Units

Terms offered: Spring 2025, 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.

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

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.

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

EPS 127 Coastal Processes 3 Units

Terms offered: Not yet offered
This course explores the dynamic processes that shape coastal landscapes, with a primary focus
on California's coasts. We will cover fundamentals of wave mechanics and sediment transport
and investigate the physical forces that shape coastal environments.

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: Douglas

EPS C129 Biometeorology 3 Units

Terms offered: Fall 2024, Fall 2022, Fall 2020
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.

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

EPS 130 Strong Motion Seismology 3 Units

Terms offered: Spring 2025, Spring 2024, Spring 2023
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.

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

EPS 131 Geochemistry 4 Units

Terms offered: Fall 2025, Fall 2024, Fall 2023
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.

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

EPS 150 Case Studies in Earth Systems 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
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.

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.

EPS C162 Planetary Astrophysics 4 Units

Terms offered: Fall 2025, Spring 2025, Spring 2024
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.

Rules & Requirements

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

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.

Instructors: Chiang, Dressing, Militzer

Also listed as: ASTRON C162

EPS C178 Applied Geophysics 3 Units

Terms offered: Fall 2024, Fall 2022, Fall 2021
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.

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

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.
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

EPS C181 Atmosphere, Ocean, and Climate Dynamics 3 Units

Terms offered: Fall 2025, Fall 2024, Fall 2023
This course examines the processes that determine the structure and circulation of the Earth's atmosphere and ocean, and how they control regional and global climate. The approach is deductive rather than descriptive: to determine the properties and behavior of the atmosphere and ocean 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 and oceanic motion, mass conservation, and thermodynamic energy balance; geostrophic flow, quasigeostrophic motion, baroclinic instability, and dynamics of extratropical cyclones and wind-driven ocean gyres.
Rules & Requirements

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

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.

Instructors: Chiang, Fung, Boos

Also listed as: GEOG C139

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.
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

EPS C183 Carbon Cycle Dynamics 3 Units

Terms offered: Spring 2025, Fall 2023, Fall 2021
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.
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

EPS H195 Senior Honors Course 3 Units

Terms offered: Fall 2024, Fall 2014, Spring 2013
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.

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.

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.

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.

EPS 198 Directed Group Study 1 - 4 Units

Terms offered: Spring 2024, Fall 2023, Spring 2023
Group studies of selected topics which vary from semester to semester.

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

EPS 199 Supervised Independent Study and Research 1 - 4 Units

Terms offered: Spring 2025, Fall 2020, Fall 2015
Enrollment is restricted by regulations.

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