

# GEOLOGY, BACHELOR OF SCIENCE

## College of Letters & Science

"Civilization exists by geological consent—subject to change without notice." — Will Durant

Geology is the study of the Earth, and in particular its history, structure, and the processes that have molded our planet and its biosphere. Geology involves the origin of continents & ocean basins, earthquakes & volcanoes, variations in global climate, and how these physical changes impact the evolution of life. All of these planetary processes are viewed through the prism of "deep time," a perspective unique to geologists and one that distinguishes geology from most of the other physical sciences.

A significant component of geology is oriented toward the interaction between humans and the Earth. This aspect includes the study of resources such as minerals, oil, and water; identification & mitigation of Earth hazards such as earthquakes, landslides, floods, and volcanic eruptions; identification & mitigation of polluted ground water; land use planning; and the study of ancient & modern climate change.

## The Program

Students interested in becoming professional geologists or continuing their geological studies at the graduate level should choose the Bachelor of Science degree program. The Bachelor of Arts program is for students interested in an interdisciplinary program of study, or who plan to go into pre-college teaching. The upper division electives are not restricted to geology courses but must be chosen to provide a relevant, coherent, and in-depth program of study.

## Undergraduate Research

The geosciences span many disciplines at UC Davis, and students have opportunities to participate in undergraduate research (<https://eps.ucdavis.edu/students/undergrad/gel/research/>) in a variety of interest areas. Many students choose to complete a senior thesis to develop their research and writing skills during their senior year.

## Internships & Careers

A degree in Geology provides students with knowledge and practical experience needed to pursue careers (<https://eps.ucdavis.edu/students/careers/>) in the geosciences (government, private sector, research, teaching). The major program includes flexibility to participate in research, internships, and fieldwork to help prepare students for these career paths. The requirements for a B.S. in Geology satisfy the coursework required for the Professional Geologist licensing process in the State of California.

## Global Learning in Geology

Consider studying or interning abroad through programs available through the Global Learning Hub (<https://eps.ucdavis.edu/students/undergrad/gel/studyabroad/>).

## Get Involved

Find your community (<https://eps.ucdavis.edu/students/undergrad/gel/involved/>) through clubs, events, seminars, and workshops relating to geoscience.

## Graduation Honors

Students graduating from the College of Letters & Science are eligible for Departmental Honors, depending on their GPA and whether or not they complete a Senior Thesis. Students who graduate with a GPA in the top percentages of their college (<https://catalog.ucdavis.edu/academic-information-policies-regulations/honors-prizes/>) will automatically graduate with Honors. Students who qualify for Honors at graduation may also be eligible for High Honors or Highest Honors, based upon the quality of their Senior Thesis (<https://eps.ucdavis.edu/students/undergrad/gel/research/>) (course number 194A-194B) or Senior Honors Thesis (course number 194HA-194HB). It is Department of Earth and Planetary Sciences policy that an "A-" grade on the thesis will earn the student High Honors, and an "A" grade will earn the student Highest Honors.

## Advising

Visit the staff major advisor (<https://eps.ucdavis.edu/students/undergrad/advising/>) for help navigating major requirements and planning for your degree. Visit the faculty major advisors (<https://eps.ucdavis.edu/students/undergrad/advising/>) for additional advice on courses, careers, and graduate school. Faculty advisors: R. Motani, D. A. Osleger, M. Rudolph.

Visit the College of Letters & Science advisors (<https://lettersandscience.ucdavis.edu/advising/>) for help navigating university requirements (<https://catalog.ucdavis.edu/undergraduate-education/university-degree-requirements/>) and college requirements (<https://catalog.ucdavis.edu/academic-information-policies-regulations/college-major-minor-information/>).

## Graduate Study

The coursework, research and internship opportunities, and fieldwork requirements in the Geology major help prepare students to enter graduate programs (<https://eps.ucdavis.edu/students/careers/gradschool/>) to continue their studies and prepare for their career. Students should meet with advisors and faculty to build a strong application for graduate school through additional independent research or other co-curricular involvements.

The major requirements below are in addition to meeting University Degree Requirements (<https://catalog.ucdavis.edu/undergraduate-education/university-degree-requirements/>) & College Degree Requirements (<https://catalog.ucdavis.edu/undergraduate-education/college-degree-requirements/>); unless otherwise noted. The minimum number of units required for the Geology Bachelor of Science is 104.

Code	Title	Units
<b>Preparatory Subject Matter</b>		
<i>Geology</i>		
GEL 050	Physical Geology	3
GEL 050L	Physical Geology Laboratory	2
GEL 053 or GEL 003	Introduction to Geobiology History of Life	3
GEL 055 or CHE 002C or CHE 004C	Introduction to Geochemistry (Discontinued) General Chemistry General Chemistry for the Physical Sciences & Engineering	3-5
GEL 056	Introduction to Geophysics (Discontinued)	4-5

or PHY 007C	General Physics	
or PHY 009C	Classical Physics	
or PHY 009HC	Honors Physics	
GEL 060	Earth Materials: Introduction	4
<i>Mathematics</i>		
Choose a series:		11-12
MAT 016A	and	
& MAT 016B DISCONTINUED		
& MAT 016C DISCONTINUED	Linear Algebra (Discontinued)	
& MAT 022A		
<b>or</b>		
MAT 017A	Calculus for Biology & Medicine	
& MAT 017B	and Calculus for Biology & Medicine	
& MAT 017C	and Calculus for Biology & Medicine	
<b>or</b>		
MAT 019A	Calculus for Data-Driven Applications	
& MAT 019B	and Calculus for Data-Driven Applications	
& MAT 019C	and Calculus for Data-Driven Applications	
& MAT 022A	and Linear Algebra	
<b>or</b>		
MAT 021A	Calculus	
& MAT 021B	and Calculus	
& MAT 022A	and Linear Algebra	
<b>or</b>		
MAT 021A	Calculus	
& MAT 021B	and Calculus	
& MAT 021C	and Calculus	
<i>Chemistry</i>		
Choose a series:		10
CHE 002A	General Chemistry	
& CHE 002B	and General Chemistry	
CHE 004A	General Chemistry for the Physical	
& CHE 004B	Sciences & Engineering and General Chemistry for the Physical	
	Sciences & Engineering	
<i>Statistics</i>		
Choose one:		4
STA 013	Elementary Statistics	
or STA 013Y	Elementary Statistics	
STA 032	Gateway to Statistical Data Science	
STA 100	Applied Statistics for Biological Sciences	
<i>Physics</i>		
Choose a series:		8-10
PHY 007A	General Physics	
& PHY 007B	and General Physics	
PHY 009A	Classical Physics	
& PHY 009B	and Classical Physics	
PHY 009HA	Honors Physics	
& PHY 009HB	and Honors Physics	
Preparatory Subject Matter Subtotal		52-58
<b>Depth Subject Matter</b>		
<i>Geology Courses</i>		
GEL 101	Structural Geology	3
GEL 101L	Structural Geology Lab	2
GEL 103	Field Geology	4

GEL 105	Earth Materials: Igneous Rocks	4
GEL 107	Earth History: Paleobiology	3
GEL 107L	Earth History: Paleobiology Laboratory	2
GEL 108	Earth History: Paleoclimates	3
GEL 109	Earth History: Sediments & Strata	3
GEL 109L	Earth History: Sediments & Strata Laboratory	2
<i>Upper Division Electives</i>		
Choose 18 units:		18
Choose from courses GEL 130-GEL 194 or pre-selected non-GEL courses. Only one of GEL 181/EDU 181 or GEL 183/EDU 183 or GEL 185A or 185B or 186 may be applied toward elective credit. Pre-selected non-GEL courses in related fields: CHE 100, ECI 171/ECI 171L, ECI 175, ESM 100, ESM 186, ESP 152, HYD 144, HYD 146, LDA 150/ABT 150, SSC 100, WFC 102. Other courses in related fields must be approved in advance by the major advisor. No more than 3 units of upper division elective credit for courses GEL 115-GEL 120. No more than 6 units of upper division elective credit for GEL 192 or GEL 194A-GEL 194B or GEL 194HA-GEL 194HB. Students who receive approval to do a senior thesis for part of the capstone requirement may not use GEL 194A-GEL 194B or GEL 194HA-GEL 194HB for the upper division elective courses.		
GEL 130	Non-Renewable Natural Resources	
GEL 131	Risk: Natural Hazards & Related Phenomena	
GEL 132	Introductory Inorganic Geochemistry	
GEL 133	Environmental Geochemistry	
GEL 134	Environmental Geology & Land Use Planning	
GEL 136	Ecogeomorphology of Rivers & Streams	
GEL 138	Introductory Volcanology	
GEL 139	Rivers: Form, Function & Management (Discontinued)	
GEL 140	Introduction to Process Geomorphology	
GEL 141	Evolutionary History of Vertebrates	
GEL 142	Basin Analysis (Discontinued)	
GEL 143	Advanced Igneous Petrology (Discontinued)	
GEL 144	Historical Ecology	
GEL 145	Advanced Metamorphic Petrology (Discontinued)	
GEL 146	Radiogenic Isotope Geochemistry & Cosmochemistry	
GEL 147	Geology of Ore Deposits (Discontinued)	
GEL 148	Stable Isotopes & Geochemical Tracers	
GEL 149	Geothermal Systems (Discontinued)	
GEL/ESP 150A	Physical & Chemical Oceanography	
GEL/ESP 150B	Geological Oceanography	
GEL/ESP 150C	Biological Oceanography	
GEL 152	Paleobiology of Protista (Discontinued)	
GEL 156/HYD 146	Hydrogeology & Contaminant Transport	
GEL 160	Geological Data Analysis	
GEL 161	Geophysical Field Methods	
GEL 162	Geophysics of the Solid Earth	

GEL 163	Planetary Geology & Geophysics
GEL 175	Advanced Field Geology
GEL/EDU 181	Teaching in Science & Mathematics
GEL 182	Field Studies in Marine Geochemistry (Discontinued)
GEL/EDU 183	Teaching High School Mathematics & Science
GEL 185A	Conceptual Integrated Science for Non- Science Majors: The Physical World
GEL 185B	Conceptual Integrated Science for Non- Science Majors: Earth System Science
GEL 186	Facilitating Learning in STEM Classrooms
GEL 190	Seminar in Geology
GEL 192	Internship in Geology
GEL 194A	Senior Thesis
GEL 194B	Senior Thesis
GEL 194HA	Senior Honors Project
GEL 194HB	Senior Honors Project
CHE 100	Environmental Water Chemistry
EDU/GEL 181	Teaching in Science & Mathematics
EDU/GEL 183	Teaching High School Mathematics & Science
ECI 171	Soil Mechanics
ECI 171L	Soil Mechanics Laboratory
ECI 175	Geotechnical Earthquake Engineering
ESM 100	Introduction to Water Science
ESM 186	Environmental Remote Sensing
ESP 152	Coastal Oceanography
HYD/EBS 144	Groundwater Hydrology
HYD 146/GEL 156	Hydrogeology & Contaminant Transport
LDA/ABT 150	Introduction to Geographic Information Systems
SSC 100	Principles of Soil Science
WFC 102	Field Studies in Fish Biology

*Capstone*

Choose two summer field courses. A senior thesis may only be substituted for one of the summer field courses with the consent of the thesis advisor and an undergraduate advisor. The decision to undertake a thesis in lieu of a summer field course must be declared by the end of the spring term of a student's junior year.

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Choose two:

GEL 110A	Summer Field Geology: Structures & Neotectonics
GEL 110B	Summer Field Geology: Volcanology
GEL 110C	Summer Field Geology: Special Projects
GEL 194A & GEL 194B	Senior Thesis and Senior Thesis
or GEL 194HA & GEL 194HB	Senior Honors Project and Senior Honors Project

Depth Subject Matter Subtotal	52-54
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<b>Total Units</b>	<b>104-112</b>
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