

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/internships/>) 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.

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.

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/>).

The major requirements below are in addition to the 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/>) for earning a Bachelor’s Degree.

| Code | Title | Units |
|-----------------------------------|-------------------------------|-------|
| Preparatory Subject Matter | | |
| <i>Geology</i> | | |
| GEL 050 | Physical Geology | 3 |
| GEL 050L | Physical Geology Laboratory | 2 |
| GEL 053 | Introduction to Geobiology | 3 |
| GEL 055 | Introduction to Geochemistry | 3 |
| GEL 056 | Introduction to Geophysics | 4 |
| GEL 060 | Earth Materials: Introduction | 4 |
| <i>Mathematics</i> | | |
| Choose a series | | 11-12 |

| | | |
|--|--|-------|
| MAT 017A & MAT 017B & MAT 017C | Calculus for Biology & Medicine and Calculus for Biology & Medicine and Calculus for Biology & Medicine | |
| or | | |
| MAT 021A & MAT 021B & MAT 022A | Calculus and Calculus and Linear Algebra | |
| or | | |
| MAT 016A & MAT 016B & MAT 016C & MAT 022A | Short Calculus and Short Calculus and Short Calculus and Linear Algebra | |
| Chemistry | | |
| Choose a series: | | 10 |
| CHE 002A & CHE 002B | General Chemistry and General Chemistry | |
| CHE 004A & CHE 004B | General Chemistry for the Physical Sciences & Engineering and General Chemistry for the Physical Sciences & Engineering | |
| Statistics | | |
| Choose one: | | 4 |
| STA 013 or STA 013Y | Elementary Statistics Elementary Statistics | |
| STA 032 | Gateway to Statistical Data Science | |
| STA 100 | Applied Statistics for Biological Sciences | |
| Physics | | |
| Choose a series: | | 8-10 |
| PHY 007A & PHY 007B | General Physics and General Physics | |
| PHY 009A & PHY 009B | Classical Physics and Classical Physics | |
| PHY 009HA & PHY 009HB | Honors Physics and Honors Physics | |
| Preparatory Subject Matter Subtotal | | 52-55 |
| Depth Subject Matter | | |
| Geology Courses | | |
| 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 |
| Upper Division Electives | | |
| 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 |
| GEL 140 | Introduction to Process Geomorphology |
| GEL 141 | Evolutionary History of Vertebrates |
| GEL 142 | Basin Analysis |
| GEL 143 | Advanced Igneous Petrology |
| GEL 144 | Historical Ecology |
| GEL 145 | Advanced Metamorphic Petrology |
| GEL 146 | Radiogenic Isotope Geochemistry & Cosmochemistry |
| GEL 147 | Geology of Ore Deposits |
| GEL 148 | Stable Isotopes & Geochemical Tracers |
| GEL 149 | Geothermal Systems |
| GEL/ESP 150A | Physical & Chemical Oceanography |
| GEL/ESP 150B | Geological Oceanography |
| GEL/ESP 150C | Biological Oceanography |
| GEL 152 | Paleobiology of Protista |
| 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 |
| 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 | Principles of Hydrologic 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. 8-10

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

Total Units 104-109