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.

Advising

Visit the staff major advisor (https://eps.ucdavis.edu/students/undergrad/advising/) for help navigating minor 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.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Preparatory Subject Matter</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Geology</strong></td>
<td></td>
</tr>
<tr>
<td>GEL 050</td>
<td>Physical Geology</td>
<td>3</td>
</tr>
<tr>
<td>GEL 050L</td>
<td>Physical Geology Laboratory</td>
<td>2</td>
</tr>
<tr>
<td>GEL 053</td>
<td>Introduction to Geobiology</td>
<td>3</td>
</tr>
<tr>
<td>GEL 055</td>
<td>Introduction to Geochemistry</td>
<td>3</td>
</tr>
<tr>
<td>GEL 056</td>
<td>Introduction to Geophysics</td>
<td>4</td>
</tr>
<tr>
<td>GEL 060</td>
<td>Earth Materials: Introduction</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td><strong>Mathematics</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Choose a series</td>
<td>11-12</td>
</tr>
<tr>
<td>MAT 017A</td>
<td>Calculus for Biology &amp; Medicine</td>
<td></td>
</tr>
<tr>
<td>&amp; MAT 017B</td>
<td>and Calculus for Biology &amp; Medicine</td>
<td></td>
</tr>
<tr>
<td>&amp; MAT 017C</td>
<td>and Calculus for Biology &amp; Medicine</td>
<td></td>
</tr>
<tr>
<td>or</td>
<td>MAT 021A Calculus</td>
<td></td>
</tr>
<tr>
<td>&amp; MAT 021B</td>
<td>and Calculus</td>
<td></td>
</tr>
<tr>
<td>&amp; MAT 022A</td>
<td>and Linear Algebra</td>
<td></td>
</tr>
<tr>
<td>or</td>
<td>MAT 016A Short Calculus</td>
<td></td>
</tr>
<tr>
<td>&amp; MAT 016B</td>
<td>and Short Calculus</td>
<td></td>
</tr>
<tr>
<td>&amp; MAT 016C</td>
<td>and Short Calculus</td>
<td></td>
</tr>
<tr>
<td>&amp; MAT 022A</td>
<td>and Linear Algebra</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Chemistry</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Choose a series</td>
<td>10</td>
</tr>
<tr>
<td>CHE 002A</td>
<td>General Chemistry</td>
<td></td>
</tr>
<tr>
<td>&amp; CHE 002B</td>
<td>and General Chemistry</td>
<td></td>
</tr>
<tr>
<td>CHE 004A</td>
<td>General Chemistry for the Physical Sciences &amp; Engineering</td>
<td></td>
</tr>
<tr>
<td>&amp; CHE 004B</td>
<td>and General Chemistry for the Physical Sciences &amp; Engineering</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Statistics</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Choose one:</td>
<td>4</td>
</tr>
<tr>
<td>STA 013</td>
<td>Elementary Statistics</td>
<td></td>
</tr>
<tr>
<td>or STA 013Y</td>
<td>Elementary Statistics</td>
<td></td>
</tr>
<tr>
<td>STA 032</td>
<td>Gateway to Statistical Data Science</td>
<td></td>
</tr>
<tr>
<td>STA 100</td>
<td>Applied Statistics for Biological Sciences</td>
<td></td>
</tr>
</tbody>
</table>
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 130-194 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 115-120. No more than 6 units of upper division elective credit for GEL 192 or 194A-194B or 194HA-194HB. Students who receive approval to do a senior thesis for part of the capstone requirement may not use 194A-194B or 194HA-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 Geology
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.

Choose two:

GEL 110A Summer Field Geology: Structures & Neotectonics
GEL 110B Summer Field Geology: Volcanology
<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEL 110C</td>
<td>Summer Field Geology: Special Projects</td>
</tr>
<tr>
<td>GEL 194A &amp; GEL 194B</td>
<td>Senior Thesis and Senior Thesis</td>
</tr>
<tr>
<td>or GEL 194HA &amp; GEL 194HB</td>
<td>Senior Honors Project and Senior Honors Project</td>
</tr>
</tbody>
</table>

**Depth Subject Matter Subtotal**  52-54

**Total Units**  104-109