

# GEOLOGY

## Geology Major

The major leading to the B.S. degree emphasizes the fundamental of the science of geology with upper-level courses that provide both breadth and depth in the curriculum. The program is designed to optimize classroom, lab and field experiences and prepare students for the modern demands of a geoscientist or entry into graduate school.

## Geology B.S. Degree- Required Courses and Recommended Course Sequence

### First Semester Credits

ENG-101 Composition	4
FYF-101 First-Year Foundations	3
MTH-111 Calculus I	4
CHM-113 Elements & Compounds Lab	1
CHM-115 Elements & Compounds	3
	<b>15</b>

### Second Semester

CHM-114 The Chemical Reaction Lab	1
CHM-116 The Chemical Reaction	3
Distribution Requirement	3
GEO-211 Physical Geology	4
MTH-112 Calculus II	4
	<b>15</b>

### Third Semester

GEO-212 Historical Geology	3
MTH-150 Elementary Statistics	3
GEO-281 Mineralogy	3
Distribution Requirement	3
PHY-171 Principles of Classical and Modern Physics	4
	<b>16</b>

### Fourth Semester

GEO-206 Solid Earth Energy & Mineral resources	3
EES-240 Principles of Environmental Engineering & Science	4
PHY-174 Appl of Classical and Modern Physics	4
CS-115 Computers and Applications	3
GEO-282 Petrology	3
	<b>17</b>

### Fifth Semester

GEO-345 Stratigraphy and Sedimentation	3
GEO-349 Structures and Tectonics	3
EES-271 Environmental Mapping I: GPS	3
Program Elective	3
Distribution requirement	3
	<b>15</b>

### Sixth Semester

GEO-352 Hydrogeology	3
EES-272 Environmental Mapping II:GIS	3
EES-302 Literature Methods	1
EES-304 Environmental Data Analysis	2
GEO-370 Geomorphology	3
Distribution Requirement	3
	<b>15</b>

### Summer Session

GEO-380 Geology Field Camp	4
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### Seventh Semester

GEO-383 Geochemistry	3
GEO-375 Geological Hazards	3
GEO-391 Senior Projects I	1
Distribution Requirements	3
Program Elective	3
Free Elective	3
	<b>16</b>

### Eighth Semester

GEO-390 Applied Geophysics	3
GEO-392 Senior Projects II	2
Program Elective	3
Distribution Requirements	3
Free Elective	3
	<b>14</b>

## GEO. GEOLOGY

### GEO-206. SOLID EARTH ENERGY AND MINERAL RESOURCES

**Credits:** 3

The distribution in both space and time of fossil fuel (crude oil, natural gas and coal), nuclear fuel minerals, and geothermal sources in the earth's crust; the formation, accumulation and extraction of these energy resources, and historical, current and projected consumption trends. Additionally, the occurrences and formational processes of metal and non-metal deposits are examined in the context of plate tectonics, earth's geologic history and energy flow. Three hours of lecture per week. Requirements: open to majors and non-majors. [GEO-206](#) qualifies for the Energy Minor and is cross-listed with [EGY-206](#).

### GEO-211. PHYSICAL GEOLOGY

**Credits:** 4

Description, analysis, and laboratory studies of earth materials, structure, and processes, including earth's surface, interior, age, and origin. Three hours of lecture and three hours of lab per week. Requirements: For CS, Engineering, Math, and Science majors only. Cross listed with [EES-211](#). [Click here for course fee.](#)

### GEO-212. HISTORICAL GEOLOGY

**Credits:** 3

A study of the geologic record of the earth's formation and evolution, including methods of dating. Two hours of lecture and three hours of lab per week. Cross listed with [EES-212](#). [Click here for course fee.](#)

#### Pre-Requisites

[GEO-211](#) or permission of the instructor.

### GEO-281. MINERALOGY

**Credits:** 3

The systematic study of the major classes of the mineral kingdom utilizing the department's collection. Concepts in crystal chemistry, crystal structure, mineral behavior, crystallography and optical mineralogy are studied and advanced techniques in mineral analysis are used. Two hours of lecture and three hours of lab per week. Cross listed with [EES-381](#). [Click here for course fee.](#)

#### Pre-Requisites

[GEO-211](#) and [CHM-115](#).

### GEO-282. PETROLOGY

**Credits:** 3

A study of the identification, classification, composition, genesis, and alteration of igneous, sedimentary, and metamorphic rocks and their relation to crustal processes and tectonic environments. Two hours of lecture and three hours of lab per week. Cross listed with [EES-382](#). [Click here for course fee.](#)

#### Pre-Requisites

[EES-381](#)

### GEO-345. STRATIGRAPHY AND SEDIMENTATION

**Credits:** 3

The study of the formation and interpretation of sedimentary systems, from sediment grains to depositional basins. The course starts from the grain scale and moves up to basin and global scales. Two hours of lecture and three hours of lab per week.

[Click here for course fee.](#)

#### Pre-Requisites

[GEO-211](#), [GEO-212](#)

### GEO-349. STRUCTURE AND TECTONICS

**Credits:** 3

The study of rock deformational processes and resulting structures in the Earth's crust with application to global and regional tectonics. Lab work and field trips emphasize the use of methods to assist in the geometric and kinematic interpretation of rock structures. Two hours of lecture and three hours of lab per week.

[Click here for course fee.](#)

#### Pre-Requisites

[GEO-281](#), [GEO-282](#)

### GEO-352. HYDROGEOLOGY

**Credits:** 3

An introduction to the study of groundwater: groundwater flow, well hydraulics, groundwater quality and pollution, and resource exploration, evaluation, and management. Lab activities use a mix of field, wet lab, computer and mapping skills. Two hours of lecture and three hours of lab per week.

[Click here for course fee.](#)

#### Pre-Requisites

[GEO-211](#)

### GEO-370. GEOMORPHOLOGY

**Credits:** 3

#### Fees:

Land forms, their evolution, and the human role in changing the surface of the earth, utilization of geologic and hydrologic information, and field investigations. Two hours of lecture and three hours of lab per week. Cross listed with [EES-370](#).

[Click here for course fee.](#)

#### Pre-Requisites

[GEO-211](#).

### GEO-375. GEOLOGICAL HAZARDS

**Credits:** 3

#### Fees:

This course examines geologic processes that are a natural consequence of plate tectonics and hazardous to life and property. After establishing a framework for geologic hazards study, principle geologic hazards will be investigated. Emphasis will be placed on current scientific understanding, event frequency, forecasting and monitoring and mitigation. Several case studies will be included. Three hours of lecture per week.

#### Pre-Requisites

[GEO-211](#), [GEO-212](#)

**GEO-380. GEOLOGY FIELD CAMP****Credits:** 4**Fees:**

A four-week summer field course designed to train students in traditional and modern methods of geologic investigations. Students learn to develop research strategies, collect field observations and measurements, compile detailed rock descriptions, measure stratigraphic sections and construct geologic maps and cross sections. Field locations may range from local/regional to western U.S. depending on course emphasis and resources.

[Click here for course fee.](#)

**Pre-Requisites**

CHM-115, CHM-116, GEO-211, GEO-281, GEO-282

**GEO-383. GEOCHEMISTRY****Credits:** 3**Fees:**

Application of chemistry to study the distribution and cycling of elements in the crust of the earth. Includes chemical bonding and crystallization, phase rules and phase diagrams, chemical equilibria, radiogenic and stable isotopes and origin of elements. Geochemical environments of study include low-temperature aqueous solutions and high-temperature magmatic systems. Two hours of lecture and three hours of lab per week.

[Click here for course fee.](#)

**Pre-Requisites**

CHM-115, CHM-116, GEO-211, GEO-281, GEO-282

**GEO-390. APPLIED GEOPHYSICS****Credits:** 3**Fees:**

An introduction to the application of geophysical methods to geological and environmental investigations. Topics include fundamentals of geophysics and hands-on instrument training and measurement. Instruments may include ground penetrating radar, seismic reflection and refraction, electrical resistivity and electromagnetic induction. Two hours of lecture and three hours of lab per week.

[Click here for course fee.](#)

**Pre-Requisites**

PHY-171, PHY-174, GEO-211

**GEO-391. SENIOR PROJECTS I****Credits:** 1**Fees:**

Design and development of selected research projects in geology under the direction of a faculty member. Capstone research deliverables include a proposal, detailed progress reports and a formal mid-year report.

Requirements: Senior standing in Geology and department permission. (See the department for more details about the department permission.)

[Click here for course fee.](#)

**GEO-392. SENIOR PROJECTS II****Credits:** 2**Fees:**

Second semester continuation of Senior Projects I. Capstone research deliverables include detailed progress reports, a professional-grade poster, a final written report, and a formal oral presentation of research project. Requirements: Senior standing in Geology and department permission. (See the department for more details about the department permission.)

[Click here for course fee.](#)

**Pre-Requisites**

GEO-391

**GEO-399. COOPERATIVE EDUCATION****Credits:** 1-6

Professional cooperative education placement in a private or public organization related to the student's academic objectives and career goals. In addition to their work experiences, students are required to submit weekly reaction papers and an academic project to a Faculty Coordinator in the student's discipline. See the Cooperative Education section of this bulletin for placement procedures.

**Pre-Requisites**

Sophomore standing; minimum 2.0 cumulative GPA; consent of the academic advisor; and approval of placement by the department chairperson.