

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. Total credits - 122

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

First Semester Credits

[[CHM-115]] Elements & Compounds	3
[[CHM-113]] Elements & Compounds Lab	1
[[ENG-101]] Composition	4
[[FYF-101]] First-Year Foundations	3
[[MTH-111]] Calculus I	4
	15

Second Semester

[[CHM-116]] The Chemical Reaction	3
[[CHM-114]] The Chemical Reaction Lab	1
[[GEO-101]] Intro to Geology	3
[[GEO-103]] Intro to Geology Lab	1
[[MTH-112]] Calculus II	4
Distribution Requirement	3
	15

Third Semester

[[GEO-212]] Historical Geology	3
[[GEO-281]] Mineralogy	4
[[MTH-150]] Elementary Statistics	3
[[PHY-171]] Principles of Classical and Modern Physics	4
Distribution Requirement	3
	17

Fourth Semester

[[EES-240]] Principles of Environmental Engineering & Science	3
[[EES-241]] Principles of Environmental Engineering & Science Lab	1
[[GEO-282]] Petrology	3
[[PHY-174]] Appl of Classical and Modern Physics	4
Distribution Requirement	3

	14
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Fifth Semester

[[CE-346]] Rock Engineering	3
[[ENV-321]] Hydrology	3
[[ENV-323]] Hydrology Lab	1
[[GEO-345]] Stratigraphy and Sedimentation	4
[[GIS-271]] Intro to GPS & GIS	3
	14

Sixth Semester

[[EES-302]] Literature Methods	1
[[EES-304]] Environmental Data Analysis	2
[[GEO-349]] Structure and Tectonics	4
[[GEO-351]] Paleoclimatology	3
[[GEO-352]] Hydrogeology	3
[[GIS-272]] Advanced GIS & Remote Sensing	3
	16

Summer Session

[[GEO-380]] Geology Field Camp	4
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Seventh Semester

[[GEO-390]] Applied Geophysics	3
[[GEO-391]] Senior Projects I	1
Distribution Requirements	6
Program Elective	3
	13

Eighth Semester

[[GEO-370]] Geomorphology	3
[[GEO-392]] Senior Projects II	2
Distribution Requirements	3
Free Elective	3
Program Elective	3
	14

GEO. GEOLOGY

GEO-101. INTRODUCTION TO GEOLOGY

Credits: 3

Description, analysis, and studies of earth materials, structures, and processes, including Earth's surface, interior, age, and origin. Three hours of lecture per week.

Geology

GEO-103. INTRODUCTION TO GEOLOGY LAB

Credits: 1

Fees: \$115

This lab entails lab and field experiences where rocks and minerals are studied. The interpretation of topographic and geologic maps and exercises in the fundamental procedures of geologic investigations are also included. Three hours of lab per week.

Co-Requisites

[[GEO-101]]

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.

[Click here for course fee.](#)

Pre-Requisites

[[GEO-211]] or permission of the instructor.

GEO-281. MINERALOGY

Credits: 4

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. Three hours of lecture and three hours of lab per week.

[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.

[Click here for course fee.](#)

Pre-Requisites

[[GEO-281]]

GEO-345. STRATIGRAPHY AND SEDIMENTATION

Credits: 4

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. Three hours of lecture and three hours of lab per week.

[Click here for course fee.](#)

Pre-Requisites

[[GEO-211]] or permission of the instructor.

GEO-349. STRUCTURE AND TECTONICS

Credits: 4

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. Three hours of lecture and three hours of lab per week.

[Click here for course fee.](#)

Pre-Requisites

[[GEO-282]], [[GEO-345]], [[MTH-111]], [[PHY-171]] or permission of the instructor

GEO-351. PALEOCLIMATOLOGY

Credits: 3

The goal of this course is to present an overview of the methods used to reconstruct the earth's climate history and the techniques used to determine the timing of environmental changes. Paleoclimate data from proxy records, such as ice cores or tree rings, provides a longer perspective on climatic variability than is possible from instrumental or historical records. Particular emphasis will be given to the natural controls on Earth's climate across a variety of timescales, including plate tectonic, orbital, and millennial, to centennial and sub-decadal variations. The course will focus on the climatic changes during the late Cenozoic – the time of the ice ages. Topics to be discussed will include: paleoclimatic reconstruction, climate and climatic variation, dating methods, ice cores, marine and lake sediments, corals, speleothems, soils, pollen, dendrochronology, documentary data, and paleoclimate models. Two hours of lecture and three hours of lab.

[Click here for course fee.](#)

Pre-Requisites

[[GEO-211]].

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.

[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**

[[GEO-281]], [[GEO-282]], [[GEO-345]], [[GEO-349]]

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**

[[MTH-112]], [[PHY-174]], [[GEO-211]] or permission of the instructor

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-395. INDEPENDENT STUDY**Credits:** Varies with topic**Fees:**

Departmental courses on advanced topics of special interest, not extensively treated in regularly scheduled offerings, will be presented under this course number on an occasional basis. Available for either undergraduate or graduate credit. Maybe repeated for credit

Pre-Requisites

Senior or graduate standing

GEO-396. INDEPENDENT STUDY**Credits:** Varies with topic**Fees:**

Departmental courses on advanced topics of special interest, not extensively treated in regularly scheduled offerings, will be presented under this course number on an occasional basis. Available for either undergraduate or graduate credit. Maybe repeated for credit.

Pre-Requisites

Senior or graduate standing

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.