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 [[EES-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. Cross listed with [EES-381].
Click here for course fee.

Pre-Requisites
[[GEO-211]] or [[EES-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-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 [[EES-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
[[EES-211]] or [[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]] or [[EES-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]] or [[EES-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,
evend frequency, forecasting and monitoring and mitigation.
Several case studies will be included. Three hours of lecture
per week.

Pre-Requisites
[[GEO-211]] or [[EES-211]], [[GEO-212]] or [[EES-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
gelogic 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]], or [[EES-211]],
[[GEO-281]], [[GEO-282]]

GEO-388. REGIONAL STUDIES
Credits: 2
Fees:
This capstone course is an in-depth geological study of a
region (global, or more local) that requires students to apply
fundamental knowledge and skills acquired through the
course of their college education. The region of study will be
selected by the instructor in advance of the course, taking
into consideration student interest, accessibility, and unique
field opportunities. The course furthers student scientific
research skills and enhances learning through the involvement
of advanced studies of primary rock/geologic/geophysical
relationships in a field setting, critical reading of published
geological literature, and interpretation and synthesis in oral/
written formats. Topics and scale of examination will vary
from local to global scales, but focus heavily on the regional
scale. Students will be encouraged to think scientifically and
creatively – to think from unique perspectives and explore
versatile solutions. Field study will play a significant role in
this course, and students will assist in organizing an optional
research trip over spring break to locations within the region of
interest, enhancing their overall geologic knowledge, research
and interpretation skills, and application of principles and
theories.

Pre-Requisites
Senior status and with permission from the course instructor.

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 [[EES-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-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.