GEOLOGY (GEOL)

Courses

**GEOL 001. Earth System Science. 0 or 4 Credits.**
An introduction to the earth as a closed system, the cycling of materials and energy within it, and how it interacts with the hydrosphere and atmosphere. May not be taken for credit concurrently with, or following receipt of, credit for GEOL 002.

**GEOL 002. Earth System Science. 3 Credits.**
An introduction to earth as a closed system, the cycling of materials and energy within it, and how it interacts with hydrosphere and atmosphere. No Lab. May not be taken for credit concurrently with, or following receipt of, credit for GEOL 001.

**GEOL 003. Fire & Ice. 3 Credits.**
Introduction to volcanoes/plate tectonics (“fire”) and glaciers/climate change (“ice”) using lectures, slides, discussion, and field trips. Considers Vermont and world-wide geological examples.

**GEOL 005. Mt - Lake:Geol Lake Chmpln Bsn. 4 Credits.**
Scientific principles applied to the geology and geologic history of the Lake Champlain Basin.

**GEOL 007. Earth Hazards. 0 or 3 Credits.**
Understand geological and societal causes of death and destruction by earthquakes, landslides, floods, volcanoes, storms, and avalanches around the world.

**GEOL 008. The Dynamic Earth. 3 Credits.**
Exploration of Earth from a systems perspective, the exchange of mass and energy with the atmosphere, hydrosphere and lithosphere. How geologists use the scientific method. Credit not given for both GEOL 008 and either GEOL 005 or GEOL 001.

**GEOL 010. Geological Oceanography. 0 or 3 Credits.**
Characteristics and development of the oceans, their basins and shorelines, including plate tectonic history and basic physical, chemical, and biological processes. Prerequisite: GEOL 001 or introductory science course.

**GEOL 025. Environmental Geology Survey. 3 Credits.**
Environmental Geology is the study of the interactive relationship between humans and their geologic environment. No lab.

**GEOL 053. Planetary Geology. 3 Credits.**
Characterizes the differences and similarities between the Terrestrial and Jovian Planets, the dynamic processes that shape our home planet and compares the geologic processes active in our Solar System. Prerequisites: Introductory science course or ASTR 005.

**GEOL 055. Environmental Geology. 0 or 4 Credits.**
Introduction to geologic processes and materials pertinent to environmental problems: ground water movement, supply, and contamination, waste disposal, flooding, subsidence, and landslides. Local field trips. Designed for intended natural science majors.

**GEOL 062. Earth Env & Life Through Time. 0 or 4 Credits.**
This course presents an overview of how the Earth has changed over time and how this has influenced the history of life. Prerequisites: GEOL 001, GEOL 003, GEOL 005, or GEOL 055.

**GEOL 095. Special Topics. 1-6 Credits.**
See Schedule of Courses for specific titles.

**GEOL 096. Special Topics. 1-12 Credits.**
See Schedule of Courses for specific titles.

**GEOL 101. Field Geology. 4 Credits.**
Geological evolution of western Vermont as seen through actual field mapping in the Burlington area. Specifically designed for sophomores majoring or minoring in Geology or related sciences. Prerequisite: GEOL 001, GEOL 055, or Instructor permission.

**GEOL 110. Earth Materials. 0 or 4 Credits.**
Introduction to the major rocks and rock-forming minerals and their relationship to formation/depositional environments. Pre/co-requisite: Introductory Geology course: GEOL 001, GEOL 055 or GEOL 095.

**GEOL 112. Mineralogy & Optic Crystallgrphy. 4 Credits.**

**GEOL 116. Glacial Geology. 4 Credits.**
Examines the Dynamics of glacier flow and landforms glaciers produce. Lectures, labs, and field trips emphasize processes in both modern and ancient glaciers. Prerequisites: GEOL 001, GEOL 005, or GEOL 055.

**GEOL 135. Geochemistry. 4 Credits.**
Application of many basic principles of chemistry, e.g. thermodynamic, kinetic, and transport calculations involving abiotic and biotic processes, to selected problems in the geosciences. Field trips. Pre/co-requisite: GEOL 110, CHEM 031, CHEM 032.

**GEOL 151. Geomorphology. 0 or 4 Credits.**
Examines, using lectures, labs, and field-based independent study research projects, processes which change Earth’s surface and the history of landscape development. Considers fundamental geologic constraints on environmental problems. Prerequisite: GEOL 001 OR GEOL 055. Cross-listed with: GEG 144.

**GEOL 153. Stratigraphy & Sedimentology. 0 or 4 Credits.**
Properties of physical sedimentation, principles of stratigraphy and basin analysis, and comparison of modern and ancient environments. Lab includes field trips. Prerequisite: GEOL 062.

**GEOL 161. Field Methods in Geophysics. 0-4 Credits.**
This course is an introduction to field geophysical methods with an emphasis on ground-penetrating radar, seismic refraction, electromagnetic profiling, and applications to geologic problems. Prerequisite: GEOL 101.

**GEOL 172. Regional Geology. 0-4 Credits.**
Field study of a selected region including multi-week summer trip to the area in question. Not more than four credits allowed toward major. Prerequisites: one other Geology course or Instructor permission.
GEOL 195. Special Topics. 1-6 Credits.
See Schedule of Courses for specific titles.

GEOL 196. Special Topics. 1-15 Credits.
See Schedule of Courses for specific titles.

GEOL 197. Research in Geology. 1-6 Credits.
Supervised research and readings in a selected field of geology. Students from allied sciences, Mathematics, and Engineering may elect a research problem that combines their major field of study and geology. Prerequisite: Department permission.

GEOL 198. Research in Geology. 1-6 Credits.
Supervised research and readings in a selected field of geology. Students from allied sciences, mathematics, and engineering may elect a research problem that combines their major field of study and Geology. Prerequisite: Department permission.

GEOL 201. Advanced Field Geology. 3 Credits.
Advanced field mapping techniques, analysis of field data, preparation of geological maps and reports. Prerequisite: GEOL 260.

GEOL 210. Systems Dynamics & Earth Sci. 3 Credits.
Analysis of generic systems with examples from physical and natural sciences. Geological systems emphasized. Laboratories involve computer analysis of system structure and behavior over time. Prerequisites: A major or minor in science, Mathematics, Natural Resources, Engineering, or permission of Instructor.

GEOL 217. Vermont Field Geology. 4 Credits.
Field observations of rocks and surficial materials across northern Vermont are utilized to decipher the region’s geologic history. Readings complement field work. Pre/co-requisite: Graduate student standing.

GEOL 231. Petrology. 4 Credits.
The course covers the scope and methods of igneous, sedimentary and metamorphic petrology, and the geologic environments and processes relevant to the major rock types. Pre/co-requisite: GEOL 110.

GEOL 233. Environmental Isotope Geochem. 3 Credits.
Course focuses on stable isotope geochemistry of low temperature processes occurring on and near the earth surface through lecture, laboratory, and seminar. Prerequisite: Introductory Chemistry.

GEOL 234. Global Biogeochemical Cycles. 3 Credits.
Integrated perspective on biogeochemical cycles describing the transformation and movement of chemical substances in the natural environment, as seen on the global context. Prerequisite: Introductory Chemistry.

GEOL 235. Geochemistry of Natural Waters. 3 Credits.
Basic concepts of chemical equilibria applied to natural waters, including thermodynamics, pH, oxidation-reduction, weathering, and solution equilibria. Prerequisite: CHEM 031, CHEM 032.

GEOL 240. Tectonics. 3 Credits.
Applications of igneous and metamorphic petrology to problems in tectonophysics, including petrochemistry of the earth’s crust and upper mantle and the internal structure of orogenic belts. Prerequisite: GEOL 101, GEOL 110.

GEOL 242. Basin Analysis. 3 Credits.
This course examines the formation and evolution of sedimentary basins, including tectonic setting, sediment supply, and subsidence history. Prerequisite: GEOL 153.

GEOL 246. X-ray Diffractometry. 3 Credits.
This course focuses on identification and characterization of materials using X-ray diffractometry. The course will include exercises using a modern powder diffractometer. Prerequisite: CHEM 032.

GEOL 255. Geohydrology. 4 Credits.
Field-based projects address hydrologic processes in geological context; precipitation, runoff, ground water flow, river behavior, and hillslope stability. Stresses data analysis, writing, and practical approaches to water-related environmental problems. Prerequisite: Major in science or engineering or permission.

GEOL 260. Structural Geology. 0 or 4 Credits.
Examines processes and problems concerning the mechanical behavior of the Earth’s crust and surface. Includes rock deformation stress, strain, and the interpretation of geological structures. Prerequisite: GEOL 101, GEOL 110, PHYS 011, or Instructor permission.

GEOL 261. Geodynamics. 4 Credits.
Examines physical evolution of the Earth on regional to global scale. Project oriented, focusing on analysis and interpretation of geologic and geophysical data. Prerequisite: GEOL 101 and GEOL 110 or Instructor permission.

GEOL 263. Geochronology. 3 Credits.
This course will survey the basic concepts of radioactive decay, mass spectrometry, and isotopic systems commonly used to quantify the timing of geologic events. Prerequisite: GEOL 110.

GEOL 265. Geomicrobiology. 3 Credits.
An introduction to microbial control of redox chemistry on Earth’s surface, including field techniques and a detailed look at how microbes affect element cycling. Prerequisite: GEOL 135.

GEOL 266. Microstructures. 3 Credits.
This course will focus on deformation of rocks and minerals at the microscopic scale and the practical use of photographic analyses to unravel tectonic histories. Pre/co-requisite: GEOL 260.

GEOL 272. Regional Geology. 0 or 4 Credits.
Discussion of the geology of a selected region of North America; a four-week summer field trip to the area in question. Prerequisite: GEOL 101, GEOL 110, or equivalent.
GEOL 273. Geology of the Appalachians. 3 Credits.
Origin of mountain belts; the Appalachian mountain system discussed in terms of tectonics and geologic processes active in modern continental margins. Prerequisite: GEOL 101, GEOL 110, or Instructor permission.

GEOL 278. Principles of Aquatic Systems. 3 Credits.
See NR 278.

GEOL 291. Seminar in Geology. 1 Credit.
Seminar on current topics in the geosciences, including attendance at weekly departmental visiting speaker series, reading and analysis of related scholarly publications, oral/written reports. Prerequisite: Instructor permission.

GEOL 292. Senior Seminar. 1 Credit.
Seminar on current topics in the geosciences, including attendance at weekly departmental visiting speaker series, reading and analysis of related scholarly publications, oral/written reports. Prerequisite: Instructor permission.

GEOL 295. Advanced Special Topics. 1-12 Credits.
See Schedule of Courses for specific titles.

GEOL 296. Advanced Special Topics. 1-12 Credits.
See Schedule of Courses for specific titles.