

# GEOLOGY (GEOL)

---

**GEOL 1403. Physical Geology. 4 Hours. [TCCN: GEOL 1403]**

Students are introduced to the materials, processes, and structure of the earth. Topics may include earthquakes, volcanoes, plate tectonics, mountain building, weathering and erosion, glaciation, oceans, and mineral resources. The laboratory taken concurrently with the lecture includes experiences that involve the study of rocks, minerals, and map interpretations.

**GEOL 1404. Historical Geology. 4 Hours. [TCCN: GEOL 1404]**

Students are introduced to the history of the earth and its past inhabitants, including a section on the dinosaurs and their extinction. Students are given a broad overview of the tectonic evolution of the planet, indicated by various major mountain-building events; ancient environments and changing sea levels recorded in sedimentary deposits; and the evolution of life represented by the fossil record. The laboratory taken concurrently with the lecture includes the study of common animal and plant fossils and problems that illustrate practical applications of geological principles.

**GEOL 1405. Geologic & Environmental Hazards. 4 Hours. [TCCN: GEOL 1405]**

Students are introduced to the interrelationship between humans and the geologic environment, which includes the potential hazards posed by geologic processes and the planning that needs to be done to lessen their impact. It is designed to give students an overview of the fundamental Earth Science and natural hazards, including causes and effects of earthquakes, tsunamis, volcanoes, floods, landslides, hurricanes, climate change, etc. Earth materials and their uses by humans are also emphasized. Discussion will focus on personal and societal adjustments to these hazards.

**GEOL 1436. Foundations of Science. 4 Hours.**

Students focus on the nature of science as a reliable method of acquiring knowledge about the natural world. Students learn how to apply key scientific facts, concepts, laws and theories to distinguish science from non-science, bad science, and pseudoscience by analyzing a variety of claims and case studies. By employing an innovative, interdisciplinary approach to science education, this course is designed to increase science literacy and critical thinking skills for introductory-level science students. Students must enroll concurrently in the corresponding lab for this course.

**GEOL 3301. Field Methods. 3 Hours.**

Students are provided experience with common field techniques used in geologic mapping and geologic investigations. An emphasis is placed on techniques and skills used for systematic field observations and data collection for construction of stratigraphic columns, structural cross-sections, and the development of geologic maps. The course has a mandatory two-week field component.

**Prerequisite:** GEOL 1304/GEOL 1104 or GEOL 1404 and GEOL 1303/GEOL 1103 or GEOL 1403 or GEOL 1305/GEOL 1105 or GEOL 1405.

**GEOL 3326. Environmental Geology. 3 Hours.**

Students are introduced to geological processes and materials, and how they affect people and the environment. Specific topics include earthquakes, volcanism, mass wasting, floods, coastal hazards, and climatic change. Optional topics may include such items as energy and water resources, subsidence, and waste disposal.

**Prerequisite:** GEOL 1303/GEOL 1103 or GEOL 1403 or GEOL 1305/ GEOL 1105 or GEOL 1405.

**GEOL 3330. Oceanography. 3 Hours.**

Students engage in a survey of the general principles of oceanography is made. The geology of ocean basins, tide-water processes and the chemistry of sea water are studied. Biophysics of the sea and environmental problems are considered.

**Prerequisite:** GEOL 1303/1103 or GEOL 1403 or GEOL 1305/1105 or GEOL 1405.

**GEOL 3332. Forensic Geology. 3 Hours.**

Students cover many of the basic geological principles and techniques used in solving crime. A significant part of the course involves case studies as well as hands-on field and laboratory analyses.

**Prerequisite:** GEOL 1303, GEOL 1103 or GEOL 1403 plus CHEM 1311, CHEM 1111 or CHEM 1411 plus CHEM 1312, CHEM 1112, or CHEM 1412, and MATH 1316.

**GEOL 3404. Mineralogy. 4 Hours.**

Students cover crystallography, genesis of minerals, identification and classification of minerals, and optical mineralogy. Includes lab work.

**Prerequisite:** GEOL 1303/GEOL 1103 or GEOL 1403 or GEOL 1305/GEOL 1105 or GEOL 1405 and GEOL 1304/GEOL 1104 or GEOL 1404 and CHEM 1311/CHEM 1111 or CHEM 1411 and CHEM 1312/CHEM 1112 or CHEM 1412 and MATH 1316 or MATH 1410.

**GEOL 3405. Petrology. 4 Hours.**

Students engage in the classification, origin, occurrence and associations of igneous, sedimentary, and metamorphic rocks. Includes optical petrology using thin sections.

**Prerequisite:** GEOL 3404.

**GEOL 3415. Paleontology of Invertebrates. 4 Hours.**

Students focus on the fundamental concepts, principles, and methods involved in deciphering the origin, development, and extinction of past life as revealed through the study of invertebrate fossils.

**Prerequisite:** GEOL 1304/GEOL 1104 or GEOL 1404.

**GEOL 4095. Special Topics in Geology. 1-3 Hours.**

Individual study in special areas of geology. Topic content is usually selected and agreed upon by the student and a member of the Geology faculty. Sometimes special topics courses are offered by the Geology faculty. This course may be taken for Academic Distinction credit. See Academic Distinction Program in this catalog.. Variable Credit (1-3). May be repeated for credit. May be repeated for credit.

**Prerequisite:** Prerequisites and credit will be determined by the faculty member.

**GEOL 4100. Earth and Environment Seminar. 1 Hour.**

Students majoring in Environmental Science, Geography, or Geology discuss environmental problems and career opportunities with professionals in the field.

**Prerequisite:** Senior Standing.

**GEOL 4304. Geochemistry. 3 Hours.**

Students are provided a general introduction to all types of geochemistry that includes a discussion of the underlying chemical concepts, with an emphasis on the applications to geological environments. The chemical concepts include isotopic chemistry, thermodynamics, crystal chemistry, and aqueous solutions. The geological metasomatism, geothermobarometry, and environmental geochemistry. and C or better in CHEM 1412, and C or better in MATH 1420, and C or better in GEOL 1403 or GEOL 1405.

**Prerequisite:** GEOL 3404 OR 60 hrs.

**GEOL 4312. Economic Geology. 3 Hours.**

Students explore the origin and occurrence of economically important minerals. A portion of the course is devoted to petroleum.

**Prerequisite:** GEOL 1403 or GEOL 1405 plus GEOL 1404.

**GEOL 4320. Petroleum Geology. 3 Hours.**

Students review the origin and development of petroleum and natural gas deposits, and surveys the various tools used to prospect for commercial deposits of oil and natural gas.

**Prerequisite:** GEOL 1403 or GEOL 1405 plus GEOL 1404.

**GEOL 4331. Geology of North America. 3 Hours.**

Students study of the geologic history of the continent of North America. Topics may include paleogeography, major depositional areas and stratigraphic units, and paleotectonics.

**Prerequisite:** GEOL 1403 or GEOL 1405 plus GEOL 1404.

**GEOL 4337. Plate Tectonics. 3 Hours.**

Students are introduced to the movement of lithospheric plates. Topics to be covered may include earthquakes, volcanism, seismic tomography, the evolution of continents and ocean basins, and the influence of the earth's interior on these processes. Lecture only.

**Prerequisite:** GEOL 1303/1103 or GEOL 1403 or GEOL 1305/1105 or GEOL 1405 and GEOL 1304/1104 or GEOL 1404.

**GEOL 4360. Field Geology. 3 Hours.**

These courses will consist of on-site studies in structure, stratigraphy, petrology and paleontology. Field trips are taken to appropriate areas in Texas and/or surrounding states. T

**Prerequisite:** Senior standing.

**GEOL 4361. Field Geology. 3 Hours.**

These courses will consist of on-site studies in structure, stratigraphy, petrology and paleontology. Field trips will be taken to appropriate areas in Texas and/or surrounding states. T

**Prerequisite:** Senior standing.

**GEOL 4399. Environmental and Geoscience Internship. 3 Hours.**

Students apply environmental, geoscience, and/or GIS skills in a work environment. Students work with a faculty advisor and their employer to complete employer-assigned internship requirements.

**Prerequisite:** Junior Standing.

**GEOL 4400. Stratigraphy & Sedimentation. 4 Hours.**

Students study the principles and methods used in describing, classifying, and correlating strata, which includes studies of modern and ancient depositional environments. Lab/field work included.

**Prerequisite:** GEOL 3404.

**GEOL 4402. Structural Geology. 4 Hours.**

Students cover the principles of deformation of the Earth's lithosphere with emphasis on mechanical principles, identification and interpretation of structures from the microscopic scale to the scale of mountain belts. Other topics may include regional tectonics and application in petroleum exploration. Lab work focuses on graphical and quantitative techniques of analyzing geologic structures.

**Prerequisite:** GEOL 4400, PHYS 1301, PHYS 1101, and MATH 1316.

**GEOL 4413. Methods in Applied Geophysics. 4 Hours.**

Applied Geophysics involves measurements made on the surface of the Earth that are interpreted to yield the distribution of subsurface properties, particularly those having economic and engineering importance. Students are provided an introduction to the latest methods used to map the distribution of physical properties beneath the surface of the Earth and is widely recommended for students who plan to pursue careers that directly or indirectly involve subsurface imaging and analysis.

**Prerequisite:** GEOL 1403 or GEOL 1405, MATH 1420, PHYS 1301, PHYS 1101, PHYS 1302, PHYS 1102, or by permission of instructor.

**GEOL 4414. Sea Level Chg&Geological Rec. 4 Hours.**

Students examine the various modern causes of relative and absolute sea level change. In addition, students engage in an analysis of ancient geological sedimentary and stratigraphic records from the perspective of what they reveal about rates and scales of sea level change in the past as well as implications for the future. Sequence stratigraphic concepts (commonly used in the petroleum industry) are critically examined via field-based and paper and core-based studies.

**Prerequisite:** GEOL 1403 or GEOL 1405 plus GEOL 1404.

**GEOL 4426. Hydrogeology. 4 Hours.**

Students are introduced to the study of groundwater and its role in the hydrologic cycle. Topics may include properties and distribution of water on the surface, in the vadose zone and in aquifers; behavior, modeling, and geology of groundwater aquifers; human use and abuse of water resources, including groundwater contamination and extraction; and water law economics, and aquatic ecology. A lab with field trips focus on measurement and modeling of groundwater.

**Prerequisite:** MATH 1420 or permission of instructor, and GEOL 1403 or GEOL 1405 or GEOG 2341.