

# Geology (GEOL)

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## **GEOL 1110. Our Hazardous Environment. 3 Hours.**

Also offered as GEOG 1110. A detailed examination of physical environmental hazards that influence human health and habitation. Lectures focus on the causes, processes, and results of naturally occurring and human-induced geologic, hydrologic, and atmospheric events, such as earthquakes, mudflows, floods, hurricanes, soil erosion, and nuclear and toxic waste. Some mathematics is used.

## **GEOL 1121K. Principles of Physical Geology. 4 Hours.**

Prerequisite or corequisite: MATH 1001 or higher. An introduction to the physical processes responsible for the formation and ever-continuing modification of our Earth. Topics covered include the structure of the Earth and plate tectonics, volcanoes and earthquakes, formation of minerals and the rock cycle, origin and evolution of the landscape, and groundwater and energy resources.

## **GEOL 1122K. Principles of Historical Geology. 4 Hours.**

Prerequisite or corequisite: MATH 1001 or higher. An introduction to the physical and biological development of the Earth from its cosmic beginning to the present, with emphasis on reconstructing sedimentary environments, tectonic processes, and life forms represented in selected regions of North America. Topics covered include families of rocks, principles and concepts of geologic time, origin and interpretation of sedimentary rocks, evolution, plate tectonics, origin of the solar system, and a survey of Earth history through time.

## **GEOL 2010. Tools of Environmental Geoscience. 3 Hours.**

Also offered as GEOG 2010. An introduction to research techniques for the incoming environmental geoscience majors. This course includes an overview of the discipline and the tools used in geoscience research. Topics may include laboratory safety, research methods, exploration of resources (library and Internet), methods of data collection, data analysis, and scientific reporting of results.

## **GEOL 3010. Environmental Geology. 3 Hours.**

Prerequisites: Two natural science lab courses. The application of basic geologic principles and techniques to problems in land-use planning, resource management, waste disposal, conservation, energy plant siting, under-and-above-ground construction, subsidence, construction in seismic areas, slope-stability, urban development and other problems resulting from human interaction with the geological habitat.

## **GEOL 3020. Global Climate Change. 3 Hours.**

Also offered as GEOG 3020. Prerequisites: GEOG 1112K and either GEOG 1113K or GEOL 1121K. An overview of global climate change based on changes to the Earth's atmosphere, lithosphere, and hydrosphere. This course provides an analysis of past climates in the geologic, biologic, and hydrologic record, the impact of fossil fuel utilization on climate over the last 250 years, and links to ice sheets and oceans. The course examines implications of global climate change on the human population, including diseases and severe weather, as well as biogeography, including the extinction of threatened species.

## **GEOL 3050. Oceanography. 3 Hours.**

Prerequisites: Two natural science lab courses. The physical, chemical, geological, and biological characteristics of the ocean and the interactions between the hydrosphere, lithosphere, atmosphere, and biosphere.

## **GEOL 3100. Principles of Mineralogy/Petrology. 4 Hours.**

Prerequisites: Sophomore standing, GEOL 1121K and GEOL 1122K, and consent of instructor. An introduction to mineral and rock identification, and the study of the genesis, occurrence, and uses of common minerals and rocks. Laboratory consists of identification of common rocks and minerals.

## **GEOL 3101. Mineralogy. 3 Hours.**

Prerequisites: GEOL 1121K and CHEM 1211 and 1211L, or their equivalents, and/or consent of the instructor. The classification, identification, and crystallography of the principal rock-forming minerals, silicate and non-silicate; and the introduction to the use of the petrographic microscope in the study of the crystallography and identification of minerals.

## **GEOL 3102. Petrology. 3 Hours.**

Prerequisite: GEOL 3101 and/or consent of instructor. Genesis, classification, and properties of igneous, metamorphic, and sedimentary rocks. Laboratory includes the use of analytical methods, hand specimens, thin-section study with the petrographic microscope, and the macroscopic and microscopic properties of important rock types.

## **GEOL 3103. Environmental Mineralogy and Clay Materials. 4 Hours.**

Prerequisites: GEOL 1121K and CHEM 1211 and CHEM 1211L. An introduction to basic concepts of crystallography, mineralogy, and clay minerals, stressing environmental uses and applications. Includes mineral systems, analytical techniques, and basic clay surface chemistry. Laboratory exercises focus on practical applications of mineralogy useful to the modern environmental scientist. Weekend field trips required.

## **GEOL 3104. Optical Mineralogy and Petrography. 2 Hours.**

Prerequisite or corequisite: GEOL 3100. A study of the petrographic microscope, principles of optical crystallography, identification of rock-forming minerals in thin section, and description of igneous, sedimentary, and metamorphic rocks in thin section. A field trip may be required.

## **GEOL 3120. Geosciences Field Trip. 3 Hours.**

Also offered as GEOG 3120. Prerequisite: GEOG 1113K or GEOL 1121K. A study of the geology and geography of a selected region during the first week, followed by a two-week field trip to points of interest. The interactions among geology, surficial processes, and organisms and how those interactions impact humans will be emphasized. Field trip destination is different each summer. Student fee required. Offered only during Summer Session I.

**GEOL 3200. History of Life. 3 Hours.**

Prerequisites: Sophomore standing and consent of instructor. Principles of paleontology with emphasis on the history of life including vertebrates. Includes an account of the outstanding forms of life from the beginning of earthtime to the present, and those paleontologically significant groups that are uncommon, different, or extinct today.

**GEOL 3210. Introduction to Hydrology. 4 Hours.**

Also listed as GEOG 3210. Prerequisites: GEOL 1121K or GEOG 1112K, and GEOG 1113K. An introduction to surface and sub-surface hydrology, examining components of the hydrologic cycle. Topics include local and global water balance, precipitation, interception and infiltration, runoff, stream flow, water storage, and groundwater. This course makes use of some mathematical equations.

**GEOL 3220. Invertebrate Paleontology. 3 Hours.**

Prerequisite: GEOL 1122K or BIOL 2270 or permission of instructor. Identification, classification, and natural history of major groups of invertebrates preserved as fossils in the geologic record, with special attention to those forms commonly encountered in the southeastern United States. Emphasis in laboratory will include taxonomic affinities and functional morphology. Saturday (optional) field trips will be scheduled to local areas of interest.

**GEOL 3230. Vertebrate Paleontology. 3 Hours.**

Prerequisites: GEOL 1121K and GEOL 1122K, or BIOL 2010 and BIOL 2270. Geologic history and evolution of animals with backbones, with coverage of extinct groups such as the Dinosauria.

**GEOL 3240. Hydrogeology. 4 Hours.**

Also listed as GEOG 3240. Prerequisites: GEOL 1121K or GEOG 1112K, and GEOG 1113K. Introduction to the hydrology of groundwater. Study of the subsurface part of the hydrologic cycle and description of the occurrence, movement, and management of groundwater as a renewable resource. Special emphasis on surface water-groundwater interactions, sensitivity of karst aquifers to environmental stresses, water quality, groundwater contaminations, and field methods that are applied in groundwater studies. Weekend field trip(s) required.

**GEOL 3250. Micropaleontology. 3 Hours.**

Prerequisite: GEOL 1122K, GEOL 3210, or consent of instructor. The classification, stratigraphic relationships, and methods of study of microfossils with emphasis on the stratigraphically important groups.

**GEOL 3300. Process Geomorphology. 4 Hours.**

Also listed as GEOG 3300. Prerequisite: GEOL 1121K or GEOG 1112K, and GEOG 1113K. An introduction to process geomorphology examining landforms and their formative processes. Topics include weathering and slope, fluvial, coastal, aeolian, glacial, and periglacial processes, and the application of soils to geomorphology. This course makes use of some mathematical equations. Field trip required.

**GEOL 3320. Geomorphology of Fluvial and Coastal Environments. 3 Hours.**

Also listed as GEOG 3320. Prerequisite: GEOG 3300. An examination of processes and landforms in fluvial (river) and coastal environments. Fluvial topics include channel geometry and pattern, characteristics of flow, sediment load, bedforms, and floodplains. Coastal topics include the study of waves and tides, coastal sediment transport, beaches, and the effects of changing sea level. This course makes use of some mathematical equations.

**GEOL 3330. Geology, Hydrogeology, and Environmental Issues in Georgia. 3 Hours.**

Also listed as GEOG 3330. Prerequisite: GEOL 1121K. An overview of the geologic framework of Georgia and surrounding states, with emphasis on topical hydrogeologic and environmental issues that impact Georgia's environment. Students receive the appropriate geologic background necessary for careers that address environmental issues in the southeastern United States. One or more field trips to locations in the area will be included.

**GEOL 3400. Planetary Geology. 3 Hours.**

Also offered as ASTR 3400. Prerequisites: GEOL 1121K or GEOG 1112K, and GEOG 1113K. Prerequisite or corequisite: PHSC 1100 or PHYS 1111 or PHYS 2211. A study of the geology of the terrestrial planets and solid-surface moons, asteroids, comets, and meteorites. The course will focus on comparative planetary geology, with emphasis on geologic processes on the surface (e. g., volcanism, impact cratering, tectonism, erosion, mass wasting, mineralogy, and petrology), planetary interiors, and data collection methods such as remote sensing and image analysis.

**GEOL 3410. Structural Geology. 4 Hours.**

Prerequisites: GEOL 1121K and GEOL 1122K; MATH 1112 or equivalent. Structural features of rocks, such as folds, faults, joints, cleavage, and primary structures, including their origin, classification, analyses and economic relationships. A study of tectonic plate motion is included. Laboratory work includes depth and thickness problems, structure sections, and structure contour maps.

**GEOL 3450. Field Methods in Geology. 4 Hours.**

Prerequisites: Sophomore standing, GEOL 1121 and GEOL 1122K, and consent of instructor. An introduction to the basic tools and techniques used in preparation of topographic and geologic maps, and profiles and cross-sections. Includes uses of plane table, alidade, Brunton compass, and aerial photographs.

**GEOL 3500. Principles of Geochemistry. 3 Hours.**

Prerequisites: GEOL 1121K, CHEM 1211 and CHEM 1211L, and MATH 2261. The application of chemical principles to study of geological and environmental processes. Course emphasis is on understanding processes that influence the chemistry of water, sediment, and soil. Topics include aqueous solutions, thermodynamics, mineral-water equilibria, oxidation-reduction reactions, and radiogenic and stable isotopes. Laboratory component of the course is field-based.

**GEOL 3510. Environmental Issues in Economic Geology. 3 Hours.**

Prerequisite: GEOL 1121K. An introduction to the concepts and practice of economic geology, with emphasis on the environmental impact of resource exploitation focusing on the resource industries that exist in Georgia and surrounding states. Topics include traditional metals-based economic geology, industrial minerals, and energy-based resources. One or more field trips to locations in the area will be included.

**GEOL 3710. Environmental Soil Science. 4 Hours.**

Also listed as GEOG 3710. Prerequisites: CHEM 1211 and CHEM 1211L; GEOG 1113K or GEOL 1121K. Soil properties, distribution and classification, factors of soil formation, and the relationships among soils, geomorphology, and the environment, stressing analysis and use of soils and soil databases for proper urban, agricultural, and environmental land use.

**GEOL 4110. Principles of Sedimentation and Stratigraphy. 4 Hours.**

Prerequisites: GEOL 1121K and GEOL 1122K. Corequisite: GEOL 3410. The interrelationships of sedimentation, stratigraphy, and paleogeography; methods in sediment studies, stratigraphic interpretation, and correlation. Field trips required.

**GEOL 4800. Internship in Environmental Geosciences. 3-6 Hours.**

Prerequisite: Consent of instructor and Department Head. Graded "Satisfactory" or "Unsatisfactory." A supervised, practical experience using environmental geosciences skills in an appropriate organization. The course provides students with an opportunity to apply skills learned during pursuit of the environmental geosciences degree to real world situations.

**GEOL 4860. Geosciences Senior Seminar. 1 Hour.**

Also offered as GEOG 4860. Prerequisites: Junior or Senior standing and consent of the instructor. Graded "Satisfactory" or "Unsatisfactory". Exploration and selection of which option of experiential learning students will pursue as a senior. Each student will submit a proposal for approval by their supervising faculty member(s).

**GEOL 4861. Senior Thesis. 3 Hours.**

Also offered as GEOG 4861. Prerequisite: GEOG 4860 or GEOL 4860. Part of a two-course sequence in which a research project is designed by the student and supervising faculty member(s) in an approved area of interest. Students will collect sample data, conduct data analysis, and write a thesis.

**GEOL 4862. Thesis Presentation. 2 Hours.**

Also offered as GEOG 4862. Prerequisite: GEOG 4861 or GEOL 4861. The third course in a three-semester research project designed by the student and supervising faculty member(s) in an approved area of interest. Students will present their senior thesis project in both oral and poster form to the department or at an approved professional meeting.

**GEOL 4900. Special Topics in Geology. 1-6 Hours.**

Prerequisites: GEOL 1121K and GEOL 1122K, or equivalent, and consent of instructor. Topics to be assigned by instructor; may be taken more than once if topics are different; up to a total of 6 credit hours.

**GEOL 4950. Directed Studies in Geology. 1-6 Hours.**

Prerequisites: GEOL 1121K and GEOL 1122K; Junior standing; and permission of advisor, instructor, and Department Head. Study of subjects not normally found in established courses offered by this department; may also allow students to explore in more detail and/or depth subjects covered by this department, up to a maximum of 6 credit hours.