Geology (GEOL)

GEOL 121 Physical Geology (Lab) (4)
A study of the geological features and processes that shape the earth's surface and subsurface. Lectures detail major components of the earth and the dynamic processes that generate them (including rocks, minerals, fossils, mountain belts, ocean basins, tectonic activity, magma formation, and climate change). Environmental issues related to geology (earthquakes, landslides, volcanic activity, groundwater contamination, and coastal and stream erosion) are major topics of discussion. Field-oriented lab exercises utilize excellent geological exposures of the Cumberland Plateau and the nearby Appalachian Mountains. Lecture, three hours; laboratory and field trips (including one weekend trip).

GEOL 150 American Rivers (4)
A watershed studies approach to investigating river systems of North and South America, including the Tennessee, Ocoee, Colorado, Amazon and Orinoco Rivers. Watersheds will be considered in terms of their geology, hydrology, forest cover and cultural history. Special emphasis will be placed on effects of pollution and climate change on these river systems.

GEOL 221 Mineralogy (Lab) (4)
A study of the chemistry, crystal structure, and properties of minerals. Lectures focus on the connection between the atomic structure and chemical bonding of minerals and the macro-scale physical properties that dictate their role in society. Laboratory work uses the physical properties of minerals observed in hand samples, combined with microscopy and X-ray diffraction to identify the most abundant minerals in the Earth's crust. *Prerequisite: GEOL 121 and one geology course at the 200 level or higher.*

GEOL 222 Historical Geology (Lab) (4)
A study of the history of the earth, including its physical environments, the history of life, and the tectonic development of the earth throughout geologic time as recorded in the rock record. Emphasis on North America and paleoenvironments of the Cumberland Plateau. Lecture, three hours; laboratory and field trips. *Prerequisite: GEOL 121.*

GEOL 225 Sedimentology and Stratigraphy (Lab) (4)
A study of sedimentary rocks and the processes that form them. Field and class studies stress the link between modern sedimentary environments and their ancient counterparts. Emphasis on rocks of the Cumberland Plateau and other nearby areas. Lecture, three hours; laboratory and field trips. *Prerequisite: GEOL 121.*

GEOL 229 Natural Hazards (4)
A study of natural hazards, their triggering factors, societal impacts, and methods of prediction, mitigation, and response. The course will examine earthquakes, volcanoes, floods, mass wasting (landslides), wildfire, and extreme weather events. Special emphasis is placed on local issues. One required Saturday field trip. *Prerequisite: GEOL 121 or GEOL 217.*

GEOL 230 Paleoecology (4)
A study of individuals, populations, and communities of plants and animals of the geologic past: their taphonomic histories, interactions with changing environments, and relationships to the sedimentary rock record. One weekend field trip. *Prerequisite: GEOL 121.*

GEOL 235 Earth Systems and Climate Change (4)
A study of climate change, its causes, and the impact of such change on sea level, glacial regimes, and the development of life through geologic time. Special emphasis on evidence for past and recent climate change.

GEOL 236 Geology of Our Solar System (4)
A study of the diverse geochemical and geophysical processes within our solar system, touching on terrestrial planets, gas giants, and minor bodies, including icy satellites. Lectures focus on the formation of the solar system, the interior structure of terrestrial planets, planetary atmospheres, volcanism, surface processes (fluvial, aeolian, impact), meteorites as clues to the solar system's origin, and current NASA missions. One required weekend field trip. *Prerequisite: GEOL 121.*

GEOL 250 Special Topics (2 or 4)
A seminar on a topic related to geology. This course may be repeated for credit when the topic differs. *Prerequisite: Prerequisites vary by topic..*

GEOL 303 Soils (Lab) (4)
A study of soils as they relate to land use, bedrock and geomorphology, site quality, and vegetation processes. Emphasizes field interpretation of soils as one component of terrestrial ecosystems. Lecture, three hours; laboratory and field trips, three hours. *Prerequisite: FORS 121 or GEOL 121.*

GEOL 305 Economic Geological Resources (Lab) (4)
A study of economically valuable minerals and rocks (including metals, nonmetals, industrial minerals, and hydrocarbons) in terms of their origin, tectonic settings, extraction, and use. Topics include global distribution and genesis of deposits in relation to plate tectonic theory, prospecting techniques, mining methods, mining laws, economics of the mineral and petroleum industries, and environmental problems associated with exploration and development. Lecture, three hours; laboratory and field trips. *Open only to juniors or seniors pursuing majors in geology or natural resources and the environment. Prerequisite: GEOL 121 and one geology course at the 200 level or higher.*

GEOL 314 Hydrology (Lab) (4)
Occurrence, movement, quality, and behavior of water in the hydrologic cycle with emphasis on groundwater, streams, lakes and karst systems. Includes techniques and problems of measurement and utilization. Lectures, three hours; laboratory and field trips, three hours. *Prerequisite: GEOL 121.*

GEOL 315 Watershed Contaminant Hydrology (4)
A survey of the important natural and human-made contaminants and their movement through the groundwater and surface water systems of a watershed. Special emphasis is placed on metals and microplastics. *Prerequisite: GEOL 314 or FORS 314.*

GEOL 318 Geomorphology (4)
Geomorphology is the study of surficial landforms (erosional and depositional) and the processes that create them. This course investigates major controls on the development and evolution of erosional and depositional landforms, with attention to the ways earth surface processes respond to tectonic and climatic forcing. Significant emphasis is on weathering, fluvial, and slope-related (mass-wasting) processes, with additional consideration given to glacial, eolian, karst, eathering, and pedogenic (soil-related) processes. The coursework will involve collecting and interpreting field data from different geomorphic environments on the Cumberland Plateau and quantitative analysis of remote sensing data. Further course in introductory physics highly recommended. *Prerequisite: GEOL 121.*

GEOL 320 Igneous and Metamorphic Petrology (Lab) (4)
Systematic study of the genesis, occurrence, composition, and classification of igneous and metamorphic rocks. Topics to include origin and crystallization of different magma types, metamorphic processes, and tectonic environments specific to certain rock suites. Laboratory work includes hand specimen and microscopic examination of igneous and metamorphic rock suites. Lecture, three hours; laboratory and field trips. *Prerequisite: GEOL 221.*

GEOL 322 Geology of the Western United States (2)
The course focuses on the geological evolution of the West Coast, the Sierra Nevada, the Basin and Range, the San Andreas Fault, the Southern Cascades, and the Coast Ranges. Additional focus is placed on geologic issues and society, and the impact of geology on the living environment. Extensive use of geologic maps and periodicals. *Prerequisite: GEOL 121.*

GEOL 323 Geology of the Western United States Field Trip (4)
A detailed field notebook is kept by students on this three-week trip. *Prerequisite: Only open to students who have completed GEOL 322 and been admitted to the Geology of the Western U.S. Field Trip program.*

GEOL 325 Field and Structural Geology (Lab) (4)
A study of deformed rocks and an introduction to tectonics. Preparation and interpretation of geologic maps; solution of basic structural problems. Field work emphasizes geologic mapping on the Cumberland Plateau and in more structurally deformed areas in eastern Tennessee. Lecture, three hours. *Prerequisite: GEOL 121.*

GEOL 332 Oral Presentations (2)
Oral presentations of important topics and published data in forestry, geology, and other environmental sciences. Course goal is to train students through practice to give and critique oral presentations appropriate for scientific or other professional research. Each student gives several presentations and formally critiques other presentations as part of the course. *Open only to juniors or seniors pursuing majors in forestry, geology, or natural resources and the environment. Prerequisite: FORS 121 or GEOL 121.*

GEOL 432 Senior Field Project (4)
An interdisciplinary field-based study of a selected portion of the university Domain or surrounding area. The primary focus of the study is to conduct a detailed analysis of interrelationships between the project area's geology, forest cover, hydrology, archeology, economics, history, and current use, and to use these parameters to critically evaluate the land-use issues of the area. Students produce a professional-quality written report of their analysis and also orally present their results to department faculty and seniors. *Open only to seniors pursuing majors in forestry, geology, or natural resources and the environment. Prerequisite: GEOL 121.*

GEOL 444 Independent Study (2 or 4)
An opportunity for students to explore a topic of interest in an independent or directed manner. *Prerequisite: Instructor prerequisite override required.*