

GEOLOGY AND EARTH SCIENCES (GEOL)

Students may not declare a Geology and Earth Sciences major or minor during the 2022-23 academic year.

Geology is an integrative science that shapes our understanding of the planet through study of the Earth's processes. The field of geology encompasses a variety of topics, including earth materials, earth history, fossils, climate, ground and surface water, natural hazards, and environmental science. Guilford geology students are involved in hands-on field experiences, inquiry-based laboratory work, and undergraduate research. The geology major serves as a foundation for graduate study, professional geology, teaching, environmental science, environmental law, resource management and geography.

Degrees Offered

The Bachelor of Arts and Bachelor of Science degrees are offered in geology and earth sciences. Students pursuing either an A.B. or B.S. in geology also may opt for a track in environmental geology.

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- Earth Sciences Major (<https://catalog.guilford.edu/catalog/academic-departments-majors/geology-earth-sciences/earth-sciences/>)

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- Earth Science (<https://catalog.guilford.edu/catalog/academic-departments-majors/geology-earth-sciences/earth-science-minor/>)

GEOL 121. Geology and the Environment. 4.

First-hand introduction to the materials the Earth is made of, as well as the forces that shape the Earth, and interactions between human activities and the environment. Many of the labs are done in the field. Fulfills natural science/mathematics and social justice/environmental responsibility requirements (1998). Natural science/ mathematics and evaluating systems and environments requirements (2019). Offered yearly in fall.

GEOL 122. Historical Geology. 4.

Historical account of discovery of geologic time and development of the theory of evolution; origin and development of the earth; geologic history of North America – both life and lands. Emphasis in laboratory on interpretation of earth history and use of the Quaker Quadrangle. Offered yearly in spring. Fulfills natural science/mathematics requirement (1998 & 2019). Embodied and creative engagement and numeric/symbolic engagement requirements (2019).

GEOL 141. Oceanography. 4.

Formation of the earth and oceans; shape and composition of the ocean floor; plate tectonics. Waves and tides, seawater chemistry, climate and the ocean's interaction with the atmosphere. Fulfills natural science/mathematics and social justice/environmental responsibility requirements (1998). Natural science/mathematics and evaluating systems and environments requirements (2019).

GEOL 150. Special Topics. 1-8.

Recent topics include geographical information systems and remote sensing, reefs of Puerto Rico, environmental history of China, climate and history, earth systems science, GIS and image processing and soil science. May also be offered at 250, 350 and 450 levels.

GEOL 151. HP:Climate and History. 4.

Explores the roles of global climate and climate change in the evolution and development of human beings and their cultures. Topics include climate-driven migration, effects of ice ages, climate change during the last two millennia and their effects on subsistence, war, commerce and exploration and what to expect in the next century. Prerequisite: ENGL 102. Fulfills historical perspectives requirement (1998 & 2019).

GEOL 190. Terroir: The Science of Wine. 4.

An interdisciplinary look at the science behind wine. The course will investigate the geology and geography of the major wine-growing areas of the world, and see how climate, culture and geology play a role in what grapes flourish where. Students will also learn the basics of sensory evaluation of wines. Enrollment limited to students over age 21. Must provide proof of age and sign a waiver. This course is not accepted as an elective for the A.B. or the B.S. in geology, or for the minor in earth sciences. Fulfills natural science /mathematics requirement (1998 & 2019).

GEOL 215. Data Wrangling. 4.

This course will focus on techniques for data processing, manipulation, graphing, and interpretation in scientific research. The course is intended for science majors or anyone interested in quantitative data. It is NOT geology-specific - we'll use a variety of data sets and examples from the physical and social sciences. The course will use Excel very heavily, with possible occasional departures to other data manipulation tools. There are no prerequisites.

GEOL 223. Hydrology. 4.

This course is focused on the dynamic nature of the water cycle, and includes investigations on human reliance and impacts upon this vital resource. Course content will include investigation of both surface and ground water systems, including flow dynamics, precipitation, surface runoff, stream restoration, streamflow monitoring and data analysis, ground water geology, and basic well design. Laboratory included. Prerequisite: GEOL 121 or instructor permission and an understanding of algebra. Alternate years. Fulfills natural science /mathematics requirement (1998 & 2019). Numeric/symbolic engagement (2019).

GEOL 230. Environmental Pollution. 4.

This course examines the impacts of human culture and activity on the quality of air, water and soil with a focus on sources of contamination and the fate of pollutants in the environment. Laboratory focuses on experimental work and field studies that introduce students to the scientific investigation of environmental problems. Fulfills natural science /mathematics requirement (1998 & 2019). Evaluating systems and environments requirement (2019). Offered based upon demand.

GEOL 242. Natural Science Seminars. (variable credits). 4.

Studies of the biology, geology, ecology and natural history of different field areas, including the American Southwest, the Galapagos, East Africa, Brunnenburg, North Carolina and other areas. Includes a one-to three-week trip to the area being studied, depending on when the course is offered; trip includes research project. When course is offered for a minimum of 4 semester credits, the course will fulfill natural science/mathematics and social justice/environmental responsibility requirements (1998); natural science/mathematics, evaluating systems and environments requirements, and embodied and creative engagement requirements (2019).

GEOL 250. Special Topics. 8.

GEOL 260. Independent Study. 1-8.

May also be offered at 360 and 460 levels. Independent and directed research, including field and laboratory experience.

GEOL 290. Internship. 1-8.

May also be offered at the 390 level.

GEOL 311. Optical Mineralogy. 4.

Principles of optical mineralogy, basic crystallography and crystal chemistry, rock-forming minerals and mineral formation and associations. Lab will focus on mineral identification in hand specimen and thin section. Alternate years in fall. Prerequisite: CHEM 111 (may be taken concurrently with instructor permission).

GEOL 312. Petrology. 4.

Introduction to the study of igneous, sedimentary and metamorphic rocks. Principles of classification, occurrence, phase equilibria, tectonic environments and origin/formation of rocks are emphasized in lectures. Labs emphasize description, classification and interpretation of textures and mineralogy in hand sample and in thin section. Alternate years in spring. Prerequisites: GEOL 311, CHEM 112 (may be taken concurrently with instructor permission).

GEOL 335. Structural Geology. 4.

Study of the deformation of rocks of the earth's crust: descriptive and theoretical treatment of folding, faulting, jointing, unconformities, diapirs, plutons and the structural features found in igneous, metamorphic and sedimentary rocks; introduction to geophysical methods; introduction to the field of tectonics. Offered in alternate years in spring. Prerequisites: two laboratory courses in geology, MATH 115, or instructor permission.

GEOL 336. Geomorphology. 4.

Study of landforms and the processes involved in their formation, especially the investigation of fluvial and arid geomorphic cycles, coastline development, and theories of landscape evolution. Prerequisites: GEOL 121 and one other geology laboratory course or instructor permission. Offered based upon demand.

GEOL 340. Images of the Earth: GIS and Remote Sensing. 4.

Focuses on various ways to classify, represent and visualize the Earth's surface. Interpretation, creation and use of maps, aerial photographs and satellite images. Exploration, construction and use of geographic information systems (GIS) and other computer-based methods to create maps and visualize data. Application of knowledge and techniques to issues such as ecosystem management, environmental assessment, urban planning, geologic mapping, global change and archaeology. Can also count toward the CTIS major.

GEOL 350. Special Topics. 8.

GEOL 360. Independent Study. 1-8.

GEOL 390. Internship. 1-8.

GEOL 415. Paleontology. 4.

Study of fossils with major emphasis on invertebrates: classification and identification, principles of evolution and paleoecology; Earth history and the origin and history of life; application of paleontology to geologic problems, especially its use in stratigraphic studies. Includes a focus on scientific writing in geology. Offered in alternate years in fall. Prerequisites: GEOL 122 and another course in geology and/or biology and/or chemistry; Historical Perspectives or instructor permission.

GEOL 416. Sedimentology and Stratigraphy. 4.

Advanced study of sedimentary rocks. Emphasis on sedimentary processes, grain size analysis, sedimentary structures and sedimentary petrography; the description, classification, correlation and interpretation of sedimentary rocks; principles of stratigraphic nomenclature; interpretation of tectonic conditions, depositional environments and paleogeography; advanced historical geology. Prerequisites: two semesters of laboratory courses in geology or related science or instructor permission. Offered in alternate years in spring.

GEOL 450. Special Topics. 8.

GEOL 460. Independent Study. 1-8.

GEOL 470. Senior Thesis. 1-8.

Independent research project begun at end of junior year. See department for details.

GEOL 490. Departmental Honors. 1-8.

Courses