

# GEOLOGY (GEOL)

## **GEOL 100 Key Concepts in the Earth & Environmental Sciences (4 Credits)**

An exploration of significant questions and integrative concepts in Geology, their grounding in the process of scientific discovery and application, and their broader relevance to society. Designed for first-year students. Although topics vary, the courses also seek to improve students' communication skills beyond the written word.

*College Curriculum:* C100

## **GEOL 101 The Dynamic Earth: Physical Geology (3 Credits)**

An investigation of the major features of the earth and its materials and the interaction of the geologic processes active on the surface and in the interior of the earth. Topics include volcanoes, rivers, glaciers, earthquakes, natural resources, and global change. The lab course, GEOL 160, is optional.

*College Curriculum:* C200

*Domain:* NQR

## **GEOL 110 Earth's Environmental Systems: Physical Geography (3 Credits)**

Earth's Environmental Systems: Physical Geography. Introduction to the interactions between the earth's environmental systems – the atmosphere, hydrosphere, biosphere, and solid earth. Emphasis will be placed on the relationship between the environment and the human condition. The lab course, GEOL 160, is optional.

*College Curriculum:* C200

*Domain:* NQR

## **GEOL 150 First-Year Seminar (4 Credits)**

An exploration of a specific topic in Geology. A grade of C- or better fulfills the COLL 150 requirement. Although topics vary, the courses emphasize academic writing skills, reading and analysis of texts, and discussion.

*College Curriculum:* C150

## **GEOL 160 Investigating the Earth: Introductory Geology Laboratory (1 Credit)**

Investigating the Earth through exercises involving observations and interpretations of maps, minerals and rocks, groundwater and streams, coastal processes, and earthquakes. Field trips and laptop computer are required. This course may be taken concurrently or after taking GEOL 101 or GEOL 110 or GEOL 150W.

Prerequisite(s): (GEOL 101 (may be taken concurrently) or GEOL 110 (may be taken concurrently))

*Additional fees apply*

*Domain:* NQR

## **GEOL 203 Age of Dinosaurs (3 Credits)**

In this course, we'll use dinosaurs and the Mesozoic world to explore concepts of geologic time, extinction, climate change, evolution, and plate tectonics. Emphasis will also be placed on how science works and major discoveries in dinosaur paleontology.

*College Curriculum:* C200

*Domain:* NQR

## **GEOL 207 Planetary Geology (3 Credits)**

An investigation of planetary bodies in the Solar System. Topics include celestial mechanics, the formation of planets and satellites, planetary surfaces, and planetary atmospheres.

*Domain:* NQR

## **GEOL 212 Global Climate Change (3 Credits)**

An introduction to Earth's climate system and the causes of climate variability on different geologic timescales. This course will also cover recent climate changes with lessons focused on the influence of anthropogenic activity and predictions about future climate trends and their potential impacts on society.

*College Curriculum:* C200

*Domain:* NQR

## **GEOL 250 Geologic Evolution of VA (4 Credits)**

The geology and landscapes of Virginia are remarkably diverse. In this course, we will investigate the geological processes that shape the distinctive landscapes, watersheds, bedrock, and fossils of Virginia. The course is hands-on with specific modules that require observation, data collection, hypothesis testing, and critical thinking, both in the field and lab. The focus on Virginia's geological evolution will be used to introduce a wide-range of earth science topics and skills: these include earth materials, deep time, tectonic processes, surface processes, climate, and sea-level change. Although activities will focus on Virginia, the concepts learned can be applied anywhere on the Earth.

*Additional fees apply*

## **GEOL 305 Environmental Geology (3 Credits)**

The application of geology toward understanding the connections between human activities and the environment. Topics include climate change, flooding and water pollution, coastal processes, and natural hazard prediction.

Prerequisite(s): GEOL 101 or GEOL 110 or GEOL 160 or GEOL 250 or ENSP 101

*Domain:* NQR

## **GEOL 306 Marine Geology (3 Credits)**

The physical geology of the continental margins and ocean basins. Evolution of the ocean basins, oceanic circulation patterns, marine environment, and human impact are stressed.

Prerequisite(s): GEOL 101 or GEOL 110 or GEOL 150 or GEOL 150W

## **GEOL 309 Plate Tectonics (3 Credits)**

Prerequisite(s): GEOL 101 or GEOL 110 or GEOL 150 or GEOL 150W

## **GEOL 310 Regional Field Geology (1-3 Credits)**

Field techniques and their application in the study of the geology and geologic history of selected regions.

Prerequisite(s): GEOL 160 or GEOL 250

*Domain:* NQR

## **GEOL 311 Field Methods in the Earth Sciences (3 Credits)**

Field techniques and their application to solve geological and environmental problems. Topics include GPS surveying, topographic surveying, bedrock and surficial mapping, and introduction to geophysical methods. Required Spring Break field project. Offered in alternate years.

Prerequisite(s): GEOL 315 or GEOL 316 or GEOL 320 or GEOL 321 or GEOL 322 or GEOL 323 or GEOL 324 or GEOL 423

*Domain:* NQR

## **GEOL 314 Watershed Dynamics (4 Credits)**

This team-taught course will combine biologic and hydrologic approaches to explore the interactions between the physical, biological, and chemical processes active in watersheds. Emphasis will be placed on understanding how interactions between these processes control water quality and biologic diversity, and how anthropogenic activities modify these processes.

Prerequisite(s): GEOL 101 or GEOL 110 or GEOL 150 or BIOL 203 or BIOL 204

**GEOL 315 Hydrology (4 Credits)**

Quantitative investigation of the major components of the hydrologic cycle and their interactions, including atmospheric water, surface water, and groundwater.

Prerequisite(s): MATH 111 and (GEOL 160 or GEOL 250)

**GEOL 316 Environmental Geochemistry (3 Credits)**

This course examines the chemical interactions among water, rock, and biota. We will investigate the basic inorganic and organic chemistry of nutrients, metals, and carbon. Topics covered include weathering, oceanic and terrestrial biogeochemical cycles and heavy metal deposition.

Prerequisite(s): (GEOL 160 or GEOL 250) and (CHEM 103)

**GEOL 320 Earth Surface Processes (4 Credits)**

A quantitative investigation of processes that act to shape the Earth's surface. Explores the links between surface processes, tectonics, and climate; the mechanics and rates of landscape processes and evolution; and the movement of water on and near the surface.

Prerequisite(s): GEOL 160 or GEOL 250

**GEOL 321 Rock-Forming Minerals (4 Credits)**

An introduction to the structures, compositions, characteristic features, and uses of the most common minerals. This course will emphasize the fundamental role that minerals play as the building blocks of sedimentary, igneous, and metamorphic rocks.

Prerequisite(s): GEOL 160 or GEOL 250

**GEOL 322 The Sedimentary Record (4 Credits)**

An introduction to the origin and interpretation of sediments, fossils, and sedimentary rocks with a focus on depositional environments, paleoclimates, and the use of sediments, fossils, and sedimentary rocks in the interpretation of earth history.

Prerequisite(s): GEOL 160 or GEOL 250

**GEOL 323 Earth Structure & Dynamics (4 Credits)**

An introduction to the internal structure of the earth and its dynamics. Geological and geophysical characteristics of the earth are used to understand tectonic processes. Examines major earth structures and investigates the physics of deformation.

Prerequisite(s): GEOL 160 or GEOL 250

**GEOL 324 Paleoclimatology & Paleoceanography (3 Credits)**

This course investigates evidence for changes in Earth's climate system over geologic timescales and the methods used to reconstruct past climate. Information archived in geologic records from the global oceans, terrestrial landscapes, and ice sheets will be examined to explore how past climate and oceanographic changes relate to climate forcing and feedback mechanisms, and how they help contextualize present and projected future climate trends.

Prerequisite(s): GEOL 160 or GEOL 250

**GEOL 325 Paleontology (3 Credits)**

The taxonomy of fossil organisms and the role of fossils in the study of organic evolution and the time relations of rock sequences. The laboratory stresses invertebrate morphology and quantitative measurement of local marine fossils.

Prerequisite(s): GEOL 160 or GEOL 250 or BIOL 204

**GEOL 327 Igneous and Metamorphic Petrology (3 Credits)**

Mineral and rock genesis in the igneous and metamorphic environments. A study of hand specimens and thin sections, structures, textures, and areal distribution.

Prerequisite(s): GEOL 321

**GEOL 350 Earth Science for Environmental Justice (3 Credits)**

Earth Science can be a powerful tool to understand and mitigate the impacts of environmental injustice. We will analyze how the workings of power and privilege in the U.S. have led to Black, Latinx, and Native American communities being disproportionately affected by environmental problems such as pollution, water scarcity, extreme heat, and sea-level rise. We will also explore how geoscientists and community leaders can work together to solve environmental challenges. For Earth Science to truly be a tool for environmental justice, we also need a diverse and inclusive geoscience community. We will discuss the importance of diversity, equity, and inclusion in science and strategies for overcoming the barriers that currently exist.

Prerequisite(s): GEOL 100 or GEOL 101 or GEOL 110 or GEOL 150 or GEOL 203 or GEOL 212 or GEOL 250 or ENSP 101

*College Curriculum: C350*

**GEOL 404 Introduction to Geological Research (1 Credit)**

Students will develop a formal research proposal for a senior research or Honors project in consultation with their research advisor. Students will give an oral presentation to the class describing their research proposal. Class work will include discussion of research sources and questions, training in research techniques, and preliminary data collection and interpretation. Enrollment is restricted to geology majors, normally in their junior year.

**GEOL 407 Special Topics Geology (1-3 Credits)**

Advanced study of topics not routinely covered by existing courses. Subjects, prerequisites and instructor will vary from year to year.

**GEOL 409 Independent Study (1-3 Credits)**

A program for geology majors who wish to pursue independent study of a problem or topic in geology.

**GEOL 424 Sedimentology Seminar (1-3 Credits)**

Advanced seminar in topics in Sedimentology.

Prerequisite(s): GEOL 322

**GEOL 425 Structural Geology Seminar (1-3 Credits)**

Advanced seminar in topics in Structural Geology.

Prerequisite(s): GEOL 323

**GEOL 426 Paleobiology Seminar (1-3 Credits)**

Advanced seminar in topics in Paleobiology.

Prerequisite(s): GEOL 423 or BIOL 317

**GEOL 428 Geochemistry Seminar (1-3 Credits)**

Advanced seminar in topics in Geochemistry.

Prerequisite(s): GEOL 316

**GEOL 429 Hydrology Seminar (1-3 Credits)**

Advanced seminar in topics in Hydrology.

Prerequisite(s): GEOL 314 or GEOL 315

**GEOL 437 Special Topics Seminar (1-3 Credits)**

Advanced seminar.

Prerequisite(s): CHEM 103 and (GEOL 101 or GEOL 110 or GEOL 250)

**GEOL 491 Senior Research (3 Credits)**

Independent senior research study, culminating in a written paper and a formal presentation in the Spring semester. Project topics can include research, education, outreach, and science communication.

Prerequisite(s): GEOL 404

*College Curriculum: C400*

**GEOL 492 Senior Research (1 Credit)**

Independent senior research study, culminating in a written thesis and a formal presentation.

Prerequisite(s): GEOL 404

*College Curriculum: C400*

**GEOL 495 Honors (3 Credits)**

The requirements of Honors study in geology include a program of research accompanied by readings from the original literature, the satisfactory completion of a comprehensive examination in geology, and the preparation and presentation of an Honors essay based on the student's reading and research. Note: For College provisions governing the Admission to Honors, see the Department Honors section of the catalog under Requirements for the Baccalaureate Degree.

Prerequisite(s): GEOL 404

**GEOL 496 Honors (3 Credits)**

The requirements of Honors study in geology include a program of research accompanied by readings from the original literature, the satisfactory completion of a comprehensive examination in geology, and the preparation and presentation of an Honors essay based on the student's reading and research. Note: For College provisions governing the Admission to Honors, see the Department Honors section of the catalog under Requirements for the Baccalaureate Degree.

Prerequisite(s): GEOL 404

*College Curriculum: C400*

**GEOL 498 Externships in Earth & Environmental Sciences (0-3 Credits)**

An externship is a form of experiential learning in which a student observes and, where appropriate, participates in a professional work environment to gain practical insight into a specific career field. Externships provide opportunities to develop applied experience and build professional connections. This course is designed for students seeking practical career exposure in geology and environmental science through a short-term (1–4 week) work-based experience with government agencies, nonprofit organizations, private companies, or educational institutions, including museums.

Prerequisite(s): (GEOL 101 or GEOL 110 or GEOL 250 or GEOL 100 or GEOL 150)