



Bachelor of Science in Geology

www.geology.pitt.edu/uprogs.html

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Geology is a fascinating, diverse science that seeks to understand the workings of almost every aspect of the modern and ancient Earth. If you love **nature**, **science**, and **variety**, you should strongly consider a geology degree:

Nature: Geologists are fascinated by the workings of the natural world. Perhaps your curiosity has led you to observe the patterns of flowing water, or think about what fossils say about their ancient world, or pick up interesting things along a trail. Perhaps you just like the wilderness. Recent geology majors have hiked the Appalachian Trail, gone backpack camping with 'at-risk youth' in the deserts of Utah, bicycled across North America, plumbed the depths of unexplored caves, and traveled to Mongolia in pursuit of summer research. All geology majors take a 6-week summer field camp that features extensive hiking in the western U.S., Italy, New Zealand, or some other place depending on the chosen field camp program.

Science: Geology is a rigorous science that blends the best of physics, chemistry, math, and biology. Each year, research geologists garner hundreds of millions of dollars in National Science Foundation support and professional geologists spend untold millions searching for oil and valuable minerals, developing water resources, and addressing the world's environmental problems. To see whether geology is a good major for you, start with an introductory geology class (GEOL 0040, 0800, 0820, or 0860) and the Physical Geology Lab (GEOL 0055). Then be sure you are comfortable with the required physics, math, and chemistry (see requirements below)!

Variety: Geology has also always focused on the solid Earth (rocks, minerals, mountain belts, sedimentary basins, oil and gas deposits, volcanoes, etc.) as well as the history of life (paleontology). In recent years, geologists have become increasingly concerned with the history of the Earth's climate, how the changing behavior of the oceans has impacted life and climate, and how life has been affected by, and has affected, the solid Earth. For example, large volcanic eruptions, continental drift, changing sea level, and asteroid impacts have all affected the evolution of life. At the same time, the evolution of life has dramatically affected the composition of the atmosphere and oceans and hence global climate. Finally, recent NASA missions have really opened up planetary geology: how do other planets work and why are they so different from the Earth?

Core requirements of the Geology Major:

- **Physical Geology (GEOL 0040)** covers the basics of traditional geology: plate tectonics; minerals; the recognition and origin of igneous, sedimentary, and metamorphic rocks; volcanic systems; the recognition and origin of geologic structures; the determination of geologic time; and how various surficial processes (erosion, rivers, groundwater, beaches, glaciers, etc.) operate. Memorize this class and you will go far. You may take instead **Geology (GEOL 0800)**, **Natural Disasters (GEOL 0820)**, or **Environmental Geology (GEOL 0860)**. These classes emphasize different topics and switch one lecture a week for a recitation section.
- **Physical Geology Lab (GEOL 0055)** emphasizes hands-on experiences identifying rocks and minerals and working with maps, aerial photographs, and satellite images. The wide variety of labs (from groundwater to geologic maps to plate tectonics) gives you an excellent sampling of the types of problems that geologists actually work on. This is an excellent companion class to GEOL 0040, 0800, 0820, and 0860.
- **History of the Earth (GEOL 0060)** focuses on the causes and effects of long-term climate change, on the history of the oceans and the continents, and on interpreting the many geochemical and geologic clues that are used to reconstruct the history of the planet. A weekly lab focuses on the practical aspects of inferring local geologic history based on rock samples, fossils, and various types of geologic data.
- **Mineralogy (GEOL 1001)** covers the recognition of a wide variety of geologically important minerals and the fundamental factors that determine their basic properties. The class covers the symmetry present in 2- and 3-D

objects, the actual 3-D atomic architecture of different minerals, the impact of ionic size and charge on crystal chemistry and mineral properties, and how polarized light allows accurate mineral identification under high-power microscopes. These may sound like obscure topics, but they actually turn out to be pretty interesting.

- **Igneous and Metamorphic Petrology (GEOL 1003)** focuses on using the compositional and textural clues in igneous and metamorphic rocks to understand their origin and, by extension, the history of a given region. This class takes you deep into the mysteries of mineral crystallization in liquids of complex compositions and how these processes affect everything from rock and mineral textures to volcanic eruption styles. This class is an important prerequisite for our upper level course in volcanology.
- **Sedimentology and Stratigraphy (GEOL 1020)** has three main components. The first looks at fluid dynamics and sediment transport in the context of modern depositional systems (e.g., alluvial fans, sand dunes, lakes, rivers, deltas, beaches, continental shelves, reefs, and the deep ocean). The second combines careful rock observations with your knowledge of depositional systems to work out how given sedimentary sequences were deposited. The final part, stratigraphy, covers the surprisingly subtle science of applying a time scale to the rock record.
- **Structural Geology (GEOL 1100)** provides an array of analytical techniques that are used to unravel the complex and highly varied processes of deformation that characterize the world's mountain belts. A theoretical understanding of how rocks are deformed under a variety of temperature, pressure, and stress conditions is combined with observations that you can make on rocks, outcrops, and geologic maps in order to unravel the complex history of a deformed region.
- **Summer Field Camp (GEOL 1960)** is the capstone experience for geology major. The classes just listed include lab experiences and many include field trips in order to give you the practical skills you need to do geology on your own. However, the whole undergraduate experience is comprehensively integrated in summer field camp. Summer field camps vary, but all involve setting students loose in the wilderness to identify all rocks in a given area, map their distribution, and infer the Earth's history within the map area. People come back from summer field camp saying, "Now I feel like a real geologist!"

Science Co-requisites:

- MATH 0220, 0230, and 0240 or STAT 1000
- CHEM 0110, 0120
- PHYS 0174, 0175

- Exploration Geophysics (GEOL 1410)
- Environmental Geochemistry (GEOL 1515)
- Geology of the Planets (GEOL 1701)

Geology Electives: Geology majors need 9 credits from at least 3 classes numbered 1000 or above.

Here is a partial list:

- Groundwater Geology (GEOL 1051)
- Environmental Science, Ethics, Public Policy
- Paleoclimates (GEOL 1052)
- Geomorphology (landforms; GEOL 1060)

GIS Certificate: The Certificate in Geographic Information Systems is not required, but it is a great opportunity to earn electives while acquiring a range of software and image analysis skills (aerial photos, maps, and satellite images) that are highly sought after by both public and private employers. Visit www.geology/pitt.edu/gis for more information.

Q: What do I do with a geology degree?

A: Anything you want! Your scientific and map skills are great training for jobs in parks and forestry management, museum work, science education, urban and suburban planning, and many other jobs that involve nature and/or resource issues. Geology majors are also highly competitive when it comes to on-campus job fairs. Like business people, geologists analyze a lot of factual information and make rational decisions (hypotheses) based on incomplete information. Like business people, geologists are comfortable analyzing numerical data and explaining the results and significance of their data. Within the field of geology, there are environmental and geotechnical jobs for people with a B.S. A Master's degree opens up better jobs in these fields, plus oil and gas exploration jobs. With a PhD and a lot of hard work, a job at a university or government lab may be yours.

If you are worried about getting a job when you graduate, pursue as many internships as you can so that you meet potential employers and learn about additional real-world opportunities. If you love nature and science, a geology degree should give you the skills you need for the sort of job you'd enjoy, whether or not it is as a geologist. And regardless of your career path, a geology degree will provide a life-long enhanced appreciation of the natural world.