

# GEOLOGY

## What can I do with this major?

### AREAS

Some employment areas follow. Many geologists specialize at the graduate level.

#### ENERGY (Oil, Coal, Gas, Other Energy Sources)

Stratigraphy  
Sedimentology  
Structural Geology  
Geophysics  
Geochemistry  
Economic Geology  
Geomorphology  
Paleontology  
Fossil Energy  
Hydrogeology

### EMPLOYERS

Petroleum industry including oil and gas exploration, production, storage and waste disposal facilities  
Coal industry including mining exploration, grade assessment and waste disposal  
Federal government agencies:  
National Labs  
Department of Energy  
Bureau of Land Management  
Geologic Survey  
State government  
Consulting firms  
Well services and drilling companies  
Oil field machinery and supply companies

### STRATEGIES

*Geologists working in the area of energy use various methods to determine where energy sources are accumulated. They may pursue work tasks including exploration, well site operations and mudlogging.*  
Seek knowledge in engineering to aid communication, as geologists often work closely with engineers. Coursework in geophysics is also advantageous for this field.  
Gain experience with computer modeling and Global Positioning System (GPS). Both are used to locate deposits.  
Many geologists in this area of expertise work with oil and gas and may work in the geographic areas where deposits are found including offshore sites and in overseas oil-producing countries.  
This industry is subject to fluctuations, so be prepared to work on a contract basis.  
Develop excellent writing skills to publish reports and to solicit grants from government, industry and private foundations.  
Obtain leadership experience through campus organizations and work experiences for project management positions.

## AREAS

## EMPLOYERS

## STRATEGIES

### **ENVIRONMENTAL GEOLOGY**

Sedimentology  
Hydrogeology  
Shallow Geophysics  
Coastal and Marine Geology  
Geochemistry  
Oceanography  
Environmental Geology

Federal government agencies:  
National Labs  
Environmental Protection Agency  
Forest Service  
Army Corps of Engineers  
Geological Survey  
Bureau of Land Management  
Department of Defense  
State highway departments  
Public utilities companies  
Mines  
Environmental consulting firms  
Water testing labs  
Land use planning agencies  
Civil engineering firms  
Surveying companies

*Geologists in this category may focus on studying, protecting and reclaiming the environment.*  
Obtain lab experience through coursework, research with professors and internship programs related to environmental geology.  
Consider additional courses in environmental studies, biology and physics to complement this concentration.  
Develop excellent written and speaking skills, particularly for interest in public policy.  
Gain a thorough understanding of federal and state government guidelines for the management of solid, liquid and gaseous waste. Investigate certification programs for Hazardous Waste Operations and Emergency Response Standard (HAZWOPER).  
Consider earning a law degree for work with land-use laws and legal matters.

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### **GEOLOGIC MAPPING**

Structural Geology  
Stratigraphy  
Sedimentology  
Remote Sensing  
Geophysics

Federal government agencies:  
US Geological Survey  
Department of Defense  
Private companies

*Geologists interested in geologic mapping collect, process, analyze, translate and disseminate earth-science information through geologic maps.*  
Pursue experience reading maps and interpreting data sources including geological surveys and satellite images.  
Learn about surveying through part-time jobs, internships or academic opportunities.  
Develop attention to detail and excellent technical skills to utilize geologic and spatial mapping programs.  
Gain experience with modeling and Geographic Information Systems (GIS).

## AREAS

## EMPLOYERS

## STRATEGIES

### HAZARDS

#### **ENGINEERING GEOLOGY**

Seismology  
Volcanology  
Geomorphology

#### **GEOLOGIC ENGINEERING**

Civil Engineering  
Environmental Geology  
Structural Geology

Federal government agencies:  
National Oceanic and Atmospheric Administration  
Geological Survey  
Department of Defense  
Private research groups and foundations  
Consulting firms

*Geologists in this area focus on the detection of hazards such as earthquakes, volcanoes, landslides, floods and tsunamis and the effects of these hazards on the landscape.*

Gain experience in technical mapping such as digital terrain modeling; a high degree of computer skills is expected.

Consider an additional major or minor in physics, geophysics and/or engineering; knowledge of engineering is essential.

Develop excellent writing and presentation skills and be willing to travel to conduct research.

Prepare to work with teams of scientists and other staff in the field for extended periods.

Research Fundamentals of Engineering (FE) exam requirements, as this is typically the first step in becoming a Professional Engineer (PE).

Professional Engineer (PE) licensing guidelines vary by state. Check with the National Council of Examiners for Engineering and Surveying (NCEES) for links to state boards.

Obtain Ph.D. for research and administrative opportunities.

### MINERALS

Mining Engineering  
Mineralogy  
Geochemistry  
Economic Geology  
Paleontology  
Stratigraphy  
Sedimentology  
Crystallography

Geological exploration firms  
Mining companies  
Consulting firms  
Federal government agencies:  
Geologic Survey  
Office of Surface Mining, Reclamation and Enforcement  
Bureau of Land Management  
Railroad companies  
Well services and drilling companies

*Geologists who study mineralogy or mining geology area are interested in locating the accumulations of minerals or metals within the earth's crust. They may pursue work tasks including exploration, well site operations, mine design, reclamation and groundwater management.*

Become familiar with environmental regulations and government permit issues.

Consider specializing in a particular mineral or metal to build an area of expertise.

Secure experience in the field through part-time positions and internships.

Seek opportunities to develop strong technical skills, as mining geologists rely heavily on computerized models to learn about mineral deposits.

## AREAS

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### **PLANETARY SCIENCES**

Remote Sensing  
Geomorphology  
Mineralogy  
Petrology  
Geochemistry

Federal government agencies:  
National Labs  
National Aeronautics and Space Association  
Geological Survey

*Geologists involved in planetary sciences may participate in processing and analyzing data from various missions to bodies in our solar system, assisting in finding potential landing sites for exploration vehicles, mapping neighboring planets and their moons and conducting research to better understand the origins, evolutions and geologic processes operating on these bodies.*

Explore opportunities for undergraduate research. Work in this area is limited and requires many years of experience and developed research. A Ph.D. is often required.

Take additional coursework in physics to specialize in planetary sciences.

Pursue internships in national labs with space programs such as The Ames Laboratory, Jet Propulsion Laboratory and Johnson Space Center.

Seek experience with remote sensing and Geographic Information Systems (GIS) technologies.

Develop extraordinary analytical writing skills for grant writing and research.

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### **EDUCATION**

Teaching Research

Elementary/secondary public or private schools  
Colleges and universities  
Museums

Explore opportunities for undergraduate research. Develop strong communication skills, both oral and written.

Seek volunteer or paid experiences, such as camp counselor or tutor, with target age group.

Obtain certification/licensing for public school teaching, which varies by state. Acquire multiple certifications for increased employability in secondary education.

Complete a master's degree for community college teaching.

Pursue Ph.D. for college/university teaching and research. Grant writing skills are essential in academia.

### **GENERAL INFORMATION**

- A bachelor's degree is good background for pursuing technical graduate degrees as well as professional degrees in Business Administration, Medicine or Law.
- Within the many facets of geology, there is often overlap of job functions. However, many geologists find advantage in becoming more specialized.
- Gaining experience is very important, and there are many opportunities for students to obtain volunteer, part-time, summer, field camp, internship and/or co-op experiences in various geological areas.
- Possess a love of the outdoors, an interest in nature and a desire to travel.
- Develop physical stamina to work and conduct research in remote areas under various conditions.
- A bachelor's degree may be sufficient for entry-level industry positions.
- A master's degree is often preferred for state survey work, oil industry and for advancement in the field.
- Employment prospects are best for those with master's degrees, familiarity with advanced technologies such as computer modeling and willingness to relocate.
- Maintain a high GPA and secure strong faculty recommendations for admittance to graduate school.
- Research licensure and certification laws by state for pursuing registered geologist credential.
- Obtain experience in mapping and surveying. Develop skills with measuring equipment as well as laboratory equipment and processes.
- Acquire a business background to help in managing projects and assessing economic costs and benefits.
- Join groups directed toward improvement of natural resources, environment and pollution control including professional organizations related to interest area(s).
- Develop exceptional computer skills.
- Learn a foreign language for work in other countries.
- Excellent verbal and written communication skills are essential. The ability to market your skills and write proposals is necessary to maintain steady work. Grants may be necessary to start and continue projects.