

Geosciences... Now What?

Geology, Geography, and Earth Systems

What Are the Geosciences?

Geoscience is the scientific study of the planet Earth and its many different natural geologic systems. It includes the study and investigation of Earth's minerals, soil, water and energy resources: how Earth's natural systems work today, how they operated in the recent and ancient past, and how we expect they may behave in the future. The geosciences are a group of related disciplines focused on the Earth and its systems, history, and resources. In addition to rocks and fossils, geoscience can involve aspects of the climate: plants, asteroids, craters, glaciers, lakes, floods, earthquakes, landslides, sinkholes, volcanos, soil, sand, crystals, minerals, groundwater, pollen, etc. An overarching goal of the geosciences is to investigate ways that geology and climate can help or harm people.

Now, perhaps, more than ever, many students decide to pursue careers in geoscience because of a commitment to help others and to assist in global efforts to preserve and safeguard the natural environment. Studies indicate that increasing numbers of people worldwide are choosing to live in geologically at-risk areas including low-lying coasts, landslide-prone regions, areas where fresh water supplies are limited or face imminent threat of pollution, and locations subject to serious volcanic- or earthquake-related hazards. As a result, the future likely holds many opportunities for newly minted geoscientists to use their expertise to help avert disasters and perhaps save lives.

What Do Geoscientists Do?

Geoscientists study the physical aspects of the Earth, such as its composition, structure, and processes, to learn about its past, present, and future. Most geoscientists split their time between working in an office or laboratory, and working in the field. Geoscientists use a wide variety of tools, both simple and complex. In a day in the field, they may use a hammer and chisel to collect rock samples and then use sophisticated radar equipment to search for oil underground. In laboratories, they may use x rays and electron microscopes to determine the chemical and physical composition of rock samples. They also use remote sensing equipment to collect data, and advanced geographic information systems (GIS) and modeling software to analyze data.

Geoscientists often supervise the work of technicians, both in the field and in the lab. They also usually work as part of a team with other scientists and engineers. For example, some work closely with petroleum engineers to find and develop new sources of oil and natural gas. Geoscientists find jobs in environmental services, scientific and technical consulting, government and academia — and even in high finance, where insurance companies rely on them to help assess long-term risk due to climate change, earthquakes, hurricanes and other natural disasters.

Some geoscientists are involved in the search for and development of natural resources and minerals such as petroleum. Others work in environmental protection and preservation, and projects to clean up and re-claim polluted land. Some specialize in a particular aspect of the Earth, such as its oceans.

Types of geoscientists vary, but most geoscientists typically do the following tasks in their jobs:

- Plan and conduct field studies; visit locations to collect samples and conduct surveys
- Analyze aerial photographs, well logs (detailed records of geologic formations found during drilling), and other data to locate natural resource deposits and estimate their size
- Conduct laboratory tests on samples collected in the field
- Produce geologic maps and charts
- Prepare written scientific reports
- Present their findings to clients, colleagues, and other interested parties
- Review reports and research done by other scientists

What Are Some Of The Specialties In The Geosciences?

Engineering geologists apply geologic principles to civil and environmental engineering. They offer advice on major construction projects and help in other projects, such as environmental cleanup and reducing natural hazards.

Geologists study the materials, processes, and history of the Earth. They investigate how rocks were formed and what has happened to them since their formation.

Geochemists use physical and organic chemistry to study the composition of elements found in groundwater, such as water from wells or aquifers, and earth materials, such as rocks and sediment.

Geophysicists use the principles of physics to learn about the Earth's surface and interior. They also study the properties of Earth's magnetic, electric, and gravitational fields.

Glacial geologists study the physical properties and movement of glaciers and ice sheets, sometimes using such information to contribute to contemporary discussions of future climate change.

Hydrogeologists study the quantity, composition, distribution, circulation, and physical properties of both surface water and groundwater, and often play an important role in decisions involving both resource-management and land-use.

Mineralogists analyze and classify minerals and minerals systems according to their composition, genesis, and structure, usually with the goal of understanding the nature of formation and/or to locate new mineral resources.

Oceanographers study the motion and circulation of ocean waters; the physical and chemical properties of the oceans; and how these properties affect coastal areas, climate, and weather.

Paleontologists study fossils found in geological formations to trace the evolution of plant and animal life and the geologic history of the Earth.

Petroleum geologists (petrologists) explore the Earth for oil and gas deposits. They analyze geological information to identify sites that should be explored. They collect rock and sediment samples from sites through drilling and other methods and test them for the presence of oil and gas. They also estimate the size of oil and gas deposits and work to develop sites to extract oil and gas.

Seismologists study earthquakes and related phenomena like tsunamis. They use seismographs and other instruments to collect data on these events.

Stratigraphers examine the formation and layering of stratified rocks in order to understand the environment in which they formed and the clues such rocks hold regarding Earth-surface processes of the past.

Sedimentologists study the nature, origin, and distribution of sediments, such as gravel, sand, silt, and mud, and usually apply such knowledge to further understanding of the processes involved in sediment accumulation and/or genesis of economically important deposits contained therein.

Volcanologists investigate volcanoes and volcanic phenomena to better predict the potential for future eruptions and the nature of volcanic-related hazards to human health and welfare.

What Can I Do With A Degree In Geosciences?

Analyst Trade Controls
Atmospheric Scientists
Biological Technician
Buyer
[Careers in Geology](#)
[Careers in Tree Care](#)
Cartographer
Chemical Engineering
Technician
College/University Faculty
Commodity Manager
Community Affairs
Manager
Compliance Officer
Conservation Scientist
Coordinator, Safety and
Health Education
[Earth Science Education \(K-12\)](#)
[Ecology & Environmental
Sciences Careers](#)
[Eco-Tour Guide](#)
Engineering Technician
Environmental Coordinator
[Environmental Engineer](#)
Environmental Technician

Exploration Geologist
Explosives Specialist
Geobiologist
Geochemist
Geological Technician
Geologist
Geologist/Paleontologist
[Geophysicist](#)
Geophysicist
GIS Specialist
[High School Teacher](#)
[Hydrologist](#)
Laboratory Supervisor
[Land Agent](#)
[Land Surveyor](#)
Meteorologist
Mine Geologist
Minerals Processing
Technician
Mining Engineering
Technician
Oceanographer
Paleobiologist
Paleoclimatologist
Paleontologist
Petroleum Engineer Tech

Physicist
Photogrammetrist
Production Geologist
Prospector
Regulatory Law Associate
[Reservoir Manager](#)
Sales, Mining Products
Sampler Analyst
[Science Writer](#)
Site Cost Controller
Survey Technician
Surveyor
Technical coordinator
Technical Sales
Representative
Training Coordinator
Virtual Reality Modeler
Volcanist/Volcanologist
[Water Conservation
Specialist](#)
[Water Quality Specialist](#)
[Water Reclamation
Specialist](#)
[Water Resource Planner](#)
Weather Report

What Can I Do With A Degree In Geosciences? (cont.)

While a few jobs in geoscience — particularly those in the private sector — require only a bachelor's degree, for most positions, education to master's-degree level or higher will be needed. According to the American Geological Institute (AGI), more than two-thirds of geoscience PhDs find their first jobs in academia, with the remainder landing positions in government and industry.

Who Could I Work For?

Academic Institutions	Local Government Agencies	Petroleum & Natural Gas
Consulting Firms	Mines and Natural Areas	Companies
Environmental Protection Agency	Mineral and Hydrocarbon Companies	Research Companies
Financial Companies	Museums	Research Labs
Industrial/Commercial Companies	National Parks Service	Resource Exploration Companies
Libraries	National Wildlife Federation	U.S. Geological Survey
		Water Treatment Plants

Where Might I Do An Internship?

UMass Amherst Geosciences Majors Have Done Internships At The Following Sites:

New York (City of)	Denali Commission (Alaska)	Amherst (Town of)
Greenfield (Town of)	UMass Amherst	US Army Corps of Engineers
Northampton (City of)	WSHM-TV CBS 3 - Springfield	Nebraska Renewable Energy Systems (NRES)
MASSPIRG	Daily Hampshire Gazette	

Career Planning Resources & Websites (* = of particular note)

* UMass Amherst Career Services Events Calendar	www.umass.edu/careers
* UMass Amherst Geosciences Dept Career Page	www.geo.umass.edu/career-opportunities
UMass Amherst Dept of Environmental Conservation	https://eco.umass.edu/career-opportunities/
UMass Amherst Sustainability Science Masters Program	https://www.umass.edu/sustainsci/home
FOCUS2 Career and Education Planning	www.umass.edu/careers/planning for sign-in button
What Can I Do With This Major? (<i>Geology & Geography</i>)	https://www.umass.edu/careers/planning

(Click on "What Can I do with this Major" icon on the right-hand column.)

Bureau of Labor Statistics Occupational Outlook Handbook	www.bls.gov/ooh/life-physical
O-NET Online: Geoscientists	www.onetonline.org/link/summary/19-2042.00
Massachusetts Career Information System	https://portal.masscis.intocareers.org/

(Click Mass Resident to login with "Amherst/01003" Then click "Occupations" or "Assessments")

Career Planning Resources & Websites (cont.)

Big List of Links to Ocean-Related Job Boards	www.mtsociety.org/careers/resources.aspx
* Career Path Examples in the Geosciences	https://sites.agu.org/careers/paths/
* Geological Society of America: Geo Careers List from Hopkins Marine Station @ Stanford U.	http://www.geosociety.org/careers https://hopkinsmarinestation.stanford.edu
Huge List of Environmental Careers	www.khake.com/page46
Northern Illinois U. Geosciences Occupation Finder	www.niu.edu/careerservices/weblinks
Oceanography Links	http://peterbrueggeman.com/ocean/career
Riley Guide: Careers in Earth, Water, & Environ Sci	www.rileyguide.com/env.html
What is Geoscience? (PowerPoint on specialties in field)	datamonster.sbs.arizona.edu/IGERT

Geosciences Job and Internship Search Resources (* = of particular note)

UMass Amherst Specific Job Search Resources

UMass Handshake Database of Internships & Jobs	https://umass.joinhandshake.com/
* UMass Amherst Dept of Environmental Conservation	https://eco.umass.edu/for-current-students/
* UMass Amherst Local Sustainability Jobs/Internships	www.umass.edu/sustainability/resources
Job Seeker Environmental Jobs Newsletter (If listed password has expired, call Career Services for current password)	www.umass.edu/careers/jobsearch/listings

*AGU Job Board (Post your resume here too)	https://careers.agu.org/paths/
American Association of Petroleum Sciences	http://careercenter.aapg.org/jobs
American Institute of Professional Geologists (AIPG)	http://aipg.org/images/jobs/index.htm
Association of Environmental & Engineering Geologists	www.aegweb.org/?page=Careers
Earthworks Jobs By Category	http://earthworks-jobs.com/
Elements (Mineralogy / Geochemistry / Petrology)	http://elementsmagazine.org/
Energy Central Jobs	www.energycentraljobs.com
Geological Society of America Job Board	www.geosociety.org/classiads
Geology-Related Job Board Sites	www.niu.edu/careerservices/weblinks/majors
* GIS (Geographic Information System) Jobs Board	www.gisjobs.com
* GIS Jobs Clearinghouse	www.gjc.org
Green Collar Blog: Job Boards and Job Fairs	www.ejobs.org/states
* LinkedIn Geosciences Networking Groups	www.linkedin.com/groups/geoscience
List of Oceanography Job Board Sites	www.phys.ocean.dal.ca/hotlists/jobs.html
Marine Technology Society (Post resume here too)	www.mtsociety.org/careers
NOAA Oceanic & Atmospheric Student Opportunities	www.education.noaa.gov/opportunities
Society for Mining, Metallurgy & Exploration	miningjobs.smenet.org
* US Environmental Protection Agency (EPA) Jobs	www.epa.gov/careers
* USA Jobs (for ALL Federal Govt Jobs)	www.usajobs.gov

Geosciences Job and Internship Search Resources (cont.)

Not finding what you want? Ask us for our similar handout focused on Environmental Science...

General Science Jobs

General Science Jobs (widely defined) jobs.sciencecareers.org & jobs.newscientist.com
NatureJobs (widely defined) www.nature.com/naturejobs/science

Internships and Lab/Field Research in Geosciences

* CareerConnect Database of Internships & Jobs www.umass.edu/careers for sign-in button
* Finding Independent Research with UMass Faculty <http://www.umass.edu/biochem/>
American Geosciences Institute (Geosci & Public Policy) www.americangeosciences.org
American Geosciences Internships (varied) www.americangeosciences.org/workforce
* Green Drinks Northampton (hub of local communities) www.facebook.com/GreenDrinksNorthampton
* Green Jobs (store resumes & apply through site) <http://www.greenjobs.net/>
* Massachusetts (State) Environmental Agencies <http://www.mass.gov/eea/agencies>
* Student Conservation Association (SCA) www.thesca.org
UMass Amherst Dept of Environmental Conservation <https://eco.umass.edu/for-current-students/>
Water Industry Jobs www.waterjobsnow.com
Water Environment Federation (WEF) Job Bank <https://www.wef.org/about/careers/>

Professional Organizations (* = of particular note)

Many professional organization's websites have career information on them. You can often use them to search for networking events, meet a mentor in your field of study, find current research, search for internships or jobs, and gain insight into what direction within the field you may wish to pursue.

American Association of Petroleum Sciences www.aapg.org
* American Geological Institute (Geosci & Public Policy) www.americangeosciences.org
American Geophysical Union <https://sciencepolicy.agu.org/>
American Institute of Professional Geologists www.aipg.org
American Water Works Association www.awwa.org
Association of Environmental & Engineering Geologists www.aegweb.org
Association for Women Geoscientists (AWG) www.awg.org
Ecological Society of America: Fieldwork Internships www.esa.org
* Geological Society of America (GSA) www.geosociety.org
* Geological Society of Maine www.gsmmaine.org
Geoscience Information Society (GSIS) www.geoinfo.org
* Huge List of Geoscience Professional Organizations <https://geology.com/societies.htm>

Professional Organizations (cont.)

List of Geology-Related Professional Organizations	www.niu.edu/careerservices/weblinks
List of Oceanography Organizations	www.phys.ocean.dal.ca/hotlists/jobs.html
Marine Technology Society	www.mtsociety.org
National Association of Black Geoscientists	www.nabg-us.org
National Council for Science and the Environment	www.ncseonline.org (copy & paste to your browser)
Natl Oceanic & Atmospheric Administration (NOAA)	www.noaa.gov
* New England Intercollegiate Geological Conference	w3.salemstate.edu/~lhanson/NEIGC
Society for Mining, Metallurgy & Exploration	www.smenet.org
Soil Science Society of America	www.soils.org
* UMass Amherst Eco Dept Student Societies & Groups	eco.umass.edu/for-current-students/societies
US Environmental Protection Agency	www.epa.gov

Important Transferable Qualities To Include On Your Geosciences Resume

Critical-thinking skills. Geoscientists base their findings on sound observation and careful evaluation of data.

Interpersonal skills. Most geoscientists work as part of a team with engineers, technicians, and other scientists.

Problem-solving skills. Geoscientists work on complex projects filled with challenges.

Speaking skills. Geoscientists must be able to explain their findings to clients or professionals who do not have a background in geosciences.

Stamina. Geoscientists may need to hike to remote locations while carrying testing and sampling equipment when they conduct fieldwork.

Writing skills. Geoscientists write reports and research papers that explain their findings.

What Do Employers Look For? (NACE 2020 Job Outlook for Students)

TOP 10 THINGS EMPLOYERS LOOK FOR ON YOUR RESUME

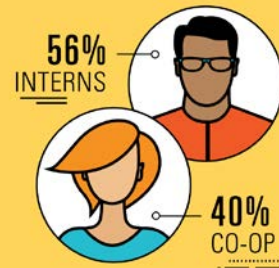


- ✓ Problem-solving skills
- ✓ Ability to work in a team
- ✓ Strong work ethic
- ✓ Analytical/quantitative skills
- ✓ Communication skills (written)
- ✓ Leadership
- ✓ Communication skills (verbal)
- ✓ Initiative
- ✓ Detail-oriented
- ✓ Technical skills

Sources: Job Outlook 2019, 2019 Internship & Co-op Report, and 2019 Recruiting Benchmarks Survey
Courtesy of the National Association of Colleges and Employers | www.nacaeed.org

EXPERIENCE IS (ALMOST) REQUIRED

When employers have equally qualified candidates, they choose the candidate with internship experience. In 2019, **56 percent of interns** and **40 percent of co-op students became full-time, entry-level hires.**



Sources: Job Outlook 2020, 2019 Internship & Co-op Report, and 2019 Recruiting Benchmarks Survey
Courtesy of the National Association of Colleges and Employers | www.nacaeed.org