

DEPARTMENT OF GEOSCIENCES
Offering BS and BA degrees in GEOLOGY and GEOGRAPHY,
and a BS degree in EARTH SYSTEMS



Geology at UMass

Geology, literally, means “word of the Earth” and geologists are concerned with understanding how our planet works. This science not only involves the study of earthquakes and volcanic eruptions, but it encompasses everything from the inner core to the upper atmosphere. Plate tectonics and biotic evolution are central paradigms of modern geology. We now know that different parts of the planet interact in complex ways, and the challenge is to explore the extent and nature of these connections. Knowing this is also crucial to our own survival and prosperity, because many of these complex Earth processes are impacted by the demands of human population growth. After all, we need to fully understand the capability of the Earth and its interrelated systems to respond to the increasing demands of population growth.

Geologists are also interested in the history of the Earth and other terrestrial planets. They study active natural features like coastlines, glaciers, rivers, lakes, and volcanoes. Geological mapping of rocks, sediments, and other features provides an increasingly detailed picture of past events and conditions; field and laboratory studies are conducted to determine the fundamental chemical and physical properties of Earth materials, and surface and ground waters. Finding and developing deposits of industrial minerals and ores, oil and gas, and groundwater aquifers, as well as managing geologic hazards and toxic wastes all require insight into geological relationships and processes. These facets give a strong practical flavor to geology to go along with the academic challenge.

A wide range of career opportunities is possible, including hydrogeology and the environmental geology industry, petroleum geology and mineral exploration, Earth science teaching or geology positions with state or federal agencies. Students will gain working knowledge and experience in the following areas:

- Fundamental geologic principles, including hands-on field experience,
- Solid background in physical sciences and math,
- History of the science and scientific method,
- New developments and discoveries in the field,
- Challenges facing humankind, including natural resources, energy, water, and global climate change.

Earth Systems at UMass

Earth Systems is the study of the processes, interactions, and feedbacks among the integrated systems of our home planet: the oceans, the atmosphere, the solid Earth, the cryosphere (snow and ice-covered regions), and the biosphere (including human activities, which are increasingly important at the global scale). The Earth systems major thus examines the Earth as a whole, to understand how it operates and how the different parts of the total Earth system work together. How many times in the last few months have you read about issues relating to Earth systems – global warming, El Niños, coastal flooding and rising sea level, earthquakes and other natural hazards, land use degradation and ever-increasing demands on natural resources and resulting environmental stresses? These are vital issues that will continue to multiply if not addressed seriously, and to understand them requires a holistic view of the Earth and how it functions.

The Earth Systems major is inter-disciplinary. It provides a broad foundation, with core courses in oceanography, geology, climatology, human geography, and global environmental change, followed by the opportunity to specialize in one or more areas that are of particular interest to you. The major builds in courses that provide you with marketable skills – statistics and data analysis, remote sensing, geographic information systems (GIS), and writing. If you are interested in the natural world, how it works, and how we as humans interact with the Earth, you should look into majoring in Earth systems.

This degree provides holistic perspectives on Earth system science, including the interactions between humans and natural systems. Students will gain working knowledge and experience in the following areas:

- Fundamental geologic principles, including atmosphere and ocean science,
- Solid background in physical and biological sciences, and math,
- Integration of large-scale Earth systems,
- Human impact on Earth systems,
- Issues and controversies of global change today.

Geography at UMass

Geography is the study of the physical and human dynamics that shape the world we live in. It is an integrative field that explores complex and dynamic interactions between physical environmental processes and the political, economic, and cultural contexts of population growth, globalization, accelerating natural resource use, urbanization, and efforts to promote conservation, sustainability, and social justice. Geographers address an extraordinary range of issues, among them: global climate change, deforestation, desertification, biodiversity loss, natural hazards, economic globalization, migration and urbanization, war and other conflicts, world hunger, human and indigenous rights, ethnic and religious conflict; virtually all of the crises and challenges facing countries and communities today are the focus of geographic research.

Human geography seeks to identify and explain patterns of settlement, social organization, culture, economies, political systems, and environmental impacts. This involves studying issues such as population change and migration, urbanization and urban change, land and water use, environmental change, conservation, sustainability, and development. We offer courses in diverse subfields of human geography, including political ecology, urban geography, political geography, and environmental history and issues.

Physical geography involves studying the physical processes, both natural and anthropogenic, that affect the earth's surface, atmosphere, and biosphere. The geography program has strengths in the study of climate, climate change, landforms and land surface processes, remote sensing of the environment, and GIS analysis and applications.

The BA and BS degrees provide broad introductions to local and global geography and give students the opportunity to focus on environmental issues, policies, and action. Studying Geography at UMass will give you the opportunity to:

- Explore the human and physical diversity of the world
- Develop new understanding of urban and economic change
- Learn about environmental issues and conservation and sustainability efforts
- Engage with US and international environmental policy and planning
- Gain useful skills in computer cartography, GIS and remote sensing

Tangible life skills

All students in the Geosciences will gain experience with tangible life skills, including:

- Critical thinking, analytic reasoning, and computational skills,
- Real-world problem solving for effective decision making,
- Working in groups and consideration of diverse perspectives,
- Effective communication, both written and oral
- Professional and ethical behavior.

For more information about the Geology, Earth Systems, or Geography degrees, please contact an academic advisor in the Department of Geosciences:

Geology Advisors

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Earth Systems Advisors

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Geography Advisors

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UMass Geosciences Research Areas

Environmental Geology/Global Change: hydrogeology, global climate studies from past to present, glacial geology, coastal processes, climate modeling, biotic response to global change, and aqueous and environmental geochemistry.

Solid Earth Geology: global plate tectonics, structural geology of the solid Earth, volcanology, origin and evolution of the continents, paleomagnetism, ancient depositional environments and abrupt events of the past, and geology of other planets in our solar system.

Environmental Geography/Human Geography/Physical Geography: environmental issues, policy, and action; political ecology, conservation, political geography of environmental management, environmental history, globalization, urban change and development, paleoclimatology, geomorphology, and GIS; remote sensing and spatial modeling of environmental systems.