University of Massachusetts Amherst

EARTH SYSTEMS

THE FIELD

Global environmental change requires a comprehensive understanding of the Earth's major systems, the important ways in which these systems are linked, and the impact of human activities on these systems. The major systems are the geosphere: processes of the Earth's surface and interior; biosphere: life on land and in the sea; atmosphere: weather and climate; hydrosphere: water in the oceans, air, and on the continents; and cryosphere: snow and ice-covered regions. The goal of Earth systems science is to obtain a scientific understanding of the integrated Earth systems on a global scale. Recent studies of the continents, oceans, atmosphere, biosphere, and ice cover have revealed a far more complex and dynamic world than previously imagined, particularly in the context of human-driven global environmental change.

In the past, diverse studies of volcanic activity, ocean chemistry, global climate change, and biological processes would have been treated in isolation. We now recognize there are important links among them, which themselves define new fields of study. Furthermore, the human population is no longer a passive spectator to Earth processes, but an active participant on a worldwide scale. Human activity has become an agent of global environmental change, depleting energy, mineral, and water resources, altering rivers, coastlines, and sedimentation patterns, polluting groundwater resources, and even changing the composition of the atmosphere, leading to climate changes with unforeseen and perhaps irreversible consequences. Distinguishing between natural changes and the results of large-scale economic and technological activity is a major challenge in Earth systems research.

There is no minor available in Earth systems.

THE MAJOR

The purpose of the Earth systems degree is to provide students with a holistic understanding of the Earth's geosphere, biosphere, atmosphere, hydrosphere, and cryosphere, as well as the impact of human activities on these systems. The degree is suitable for students interested in the interface of Earth science and related fields, and in issues related to the long-term management and sustainability of the planet. Requirements for the bachelor of science (BS) degree include coursework in the supporting sciences of biology, mathematics, physics, and chemistry, as well as the core Earth science classes. Students also choose electives in consultation with an advisor that should broaden their knowledge in one or more areas of Earth systems. The range of elective fields includes geosciences, biology, computer science, environmental sciences, forestry, microbiology, natural resources conservation, physics, plant and soil sciences, political science, resource economics, resource planning, statistics, and wildlife and fisheries conservation.

HONORS

Contact the departmental honors coordinator for information on how to pursue honors opportunities within the major.

STUDY ABROAD

Majors may choose to study abroad if it supports their academic and career goals. Students should contact the International Programs Office (413-545-2710; umass.edu/ipo) and work closely with their academic advisor to choose the appropriate courses in preparation.

CAREER OPPORTUNITIES

Earth systems majors will be well prepared for careers in a wide range of environmental fields. Their rigorous science training, combined with a broad perspective on global environmental systems, will equip them for employment in government agencies and businesses concerned with environmental issues. Students will also be well positioned to continue their studies at the graduate level in specializations related to Earth science, geography, sustainability, and environmental management, thereby enhancing their career potential.

University of Massachusetts Amherst

EARTH SYSTEMS

(CONTINUED)

COLLEGE OF NATURAL SCIENCES

The College of Natural Sciences unites the life, environmental, computational, and physical sciences on campus. Students take advantage of a range of inquiry-based classroom and laboratory experiences, hands-on undergraduate research opportunities, multidisciplinary and cross-departmental education and research initiatives, and a variety of science student organizations. In addition, they are encouraged to develop strong written and oral communication skills, as well as leadership and problem-solving abilities.

Office: 233 Morrill Science Center
Phone: 413-545-2286
Website: geo.umass.edu