Earth Sciences

Earth sciences concern the Earth’s entire physical makeup and the history of the physical and biological events that occurred within and upon it over the past four and a half billion years. Earth scientists are curious about the whole Earth, from its ancient past to its present and future, and they use the tools of chemistry, physics, biology, mathematics and other sciences to study the Earth.

At Ohio State, students choose from four specializations for the bachelor of science degree:

The geological sciences specialization focuses on the traditional areas of geology including mineralogy and petrology, sedimentation and stratigraphy, paleontology, and geochemistry. Students pursuing this specialization will be well-prepared for employment in a variety of industries and for graduate school in geological sciences.

The Earth system science specialization focuses on areas beyond traditional geological sciences including hydrogeology, glaciology, oceanography and geomorphology. Students pursuing this specialization explore relationships between Earth sciences and other disciplines, including geography, atmospheric sciences, the biological sciences, economics, natural resources and engineering.

The geophysics specialization focuses on quantitative aspects of geophysics and geodynamics and provides students preparation for admission to competitive graduate programs in geophysics, and for geophysics positions within the energy industry.

The petroleum geology and geophysics specialization combines aspects of the geological sciences and geophysics programs and trains students interested in graduate study in petroleum geology and geophysics, internships at major oil companies, and for immediate employment at small and mid-sized petroleum companies.

Pursuing Earth Sciences at Ohio State

High school students should have a strong foundation in English, mathematics, science and, if possible, computer science. The college preparatory program in many high schools is usually the most demanding and the most applicable.

Earth Sciences Requirements

The School of Earth Sciences offers two major programs, a BA (Bachelor of Arts) and a BS (Bachelor of Science). Both programs involve course work in preparation for the major and the major program itself.

BA program preparation for the major consists of the following courses in basic science and mathematics: 5 credit hours of general chemistry, 5 credit hours in calculus and analytic geometry, 8 credit hours of biological sciences, and 4 credit hours each of physical and historical geology. The BA major consists of at least 30 credit hours of course work in upper level geological science courses or other approved upper level courses in natural sciences. Most students who have pursued the BA major pursue careers other than in the Earth sciences, such as secondary education or law.

BS program preparation for the major consists of the following courses in basic science and mathematics: 5–10 credit hours of general chemistry, 10 credit hours of calculus and analytic geometry, 4 credit hours of data analysis, 5–10 credit hours of introductory physics, 4 credit hours of biological science, 4 credit hours each of physical geology and historical geology, and two additional courses in other sciences or mathematics.

Each specialization has a set of core courses and may consist of classes in mineralogy, petrology, structural geology, paleontology, sedimentation and stratigraphy, geophysics, petroleum geology, geochemistry, oceanography, geomorphology, hydrology,hydrogeology, field geology, and additional credit hours in upper-level Earth science courses. Research by students is a hallmark of the BS program and a thesis is required of all BS majors. Earth science students may and do pursue research as early as the first year in the program.

Co-Curricular Opportunities

Ohio State offers many opportunities for students to learn and grow outside of the classroom. These range from cooperative education (co-op) and internships to study abroad programs to student organizations. Co-ops and internships place students in professional environments while they are Ohio State students. Ohio State offers more than 100 study abroad programs in 40 countries around the world. In addition, there are hundreds of student organizations on campus to meet the interests of a diverse student population.

Student organizations of interest to students in Earth sciences include Geo Club, the Earth sciences national honorary society, Sigma Gamma Epsilon, and some student chapters of national professional organizations.

These experiences enable students to gain valuable work experience, learn about cultures and take on leadership roles before they enter the workforce. All of these experiences enhance learning and may provide an advantage in the job market.

For more information, check these websites:

Geological Sciences: Earthsciences.osu.edu
Arts and Sciences: artsandsciences.osu.edu
Ohio State: osu.edu

Admissions: undergrad.osu.edu
Multicultural Center: multiculturalcenter.osu.edu
Curriculum Sample — Bachelor of Science
This is a sample list of classes a student may take to pursue a degree in Earth sciences. Since university students need more than specific education in a narrow field, they also will take classes to complete General Education (GE) requirements. Because GE courses come from a variety of academic areas of study, this course work helps students develop fundamental skills essential to collegiate success and allows them to tailor these courses toward their interests. Note: This sample represents the geological sciences track as one possible path to a degree in Earth sciences.

Freshman Year:
Survey course 1
Physical Geology 4
Calculus/Analytic Geometry 10
General Chemistry 10
Physics: Particles and Motion 5
Total hours 30

Sophomore Year:
Historical Geology 4
Introductory Mineralogy and Crystallography 3
Introductory Petrology 3
Data Analysis 4
Structural Geology 4
GE courses 15
Total hours 33

Junior Year:
Biology: Energy Transfer and Development 4
Field Geology 6
Sedimentation and Stratigraphy 4
Paleontology 4
GE courses 15
Total hours 33

Senior Year:
Advanced Geological Sciences Option 6
Cognate Science 6-10
Senior Thesis 1
GE and elective courses 12
Total hours 25-29

Honors & Scholars Programs
Ohio State offers the Honors and Scholars Programs to create an environment of intellectual support and stimulation within a close-knit community of high-ability undergraduate students. Through these programs, students have access to smaller classes, undergraduate research opportunities, close working relationships with faculty, priority scheduling and unique housing options.

The Honors and Scholars Programs represent great opportunities to be part of a smaller community within a large university. Learn more about these programs at honors-scholars.osu.edu.

Career Prospects in Earth Sciences
Earth scientists work outdoors in the field and indoors in laboratories and offices. The field may be at sea, deep in the oceans, or on land in mountains, plains, deserts or polar ice sheets. For some, it is all of the above. Laboratories and offices may be located at universities, corporations, or on federal, state, county, civic or private premises. Sometimes, the lab is on the site as well as indoors. Almost all of them identify and describe samples of the natural materials (soil or sediment, minerals or rocks, fossils or trace fossils, water or ice), which they collect and study.

Sampling of Earth materials requires equipment, from a rock pick to a drilling rig, and final identification and description of these samples usually requires use of laboratory instruments including X-ray diffractometer, electron microscope, seismograph, nuclear magnetic resonance analyzer, cryogenic magnetometer, special optical microscope, mass spectograph, Mossbauer spectograph, supercomputers, geographical information system (GIS), lots of specialized software, and, always, a personal computer. Some Earth scientists monitor drilling and take samples from deep boreholes. Some dredge samples from the deep oceans. Some sample landfills. Some design equipment to sample gas and dust from the outer limits of the atmosphere or obtain ice cores from high elevation glaciers. They all study samples, and many travel to Antarctica. One Earth scientist has even been to the moon.

Starting salaries for graduates with a BS in Earth sciences average $88,500 annually. Starting salaries for MS graduates averaged $99,000 and PhD graduates’ starting salaries averaged $108,000 (2012 American Association of Petroleum Geologists survey). Civic employers typically pay the least; corporate employers typically pay the most. State and federal governments tend to fall in between. Graduates with a BA in Earth sciences usually start employment at the low end of the BS salary range.

Revised September 2015. Information subject to change. For the most up-to-date information on the Earth sciences program, visit Earthsciences.osu.edu.

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