

EARTH SCIENCE

College of Natural and Behavioral Sciences

Department of Earth Science and Geography (<https://www.csudh.edu/earth/>)

Program Description

The Earth Science major is one of two programs housed in the Department of Earth Science and Geography. The Earth Science degree is a cross-disciplinary program that trains students for careers involving earth system science, which broadly includes the physical science behind the interactions of the lithosphere, atmosphere, and hydrosphere. The Earth Science program also examines the contribution of those systems to natural landscapes and geological hazards. Importantly, it also considers the relationship of human populations to these geosystems.

If you are curious about the answers to the following questions, Earth Science might be the right major for you:

- How and when did the Earth form? How has Earth evolved? What is the history of life on Earth? When did mass extinctions occur, and what caused them?
- What is plate tectonics, and how do tectonic plates interact? How do mountains form? Where and why do volcanoes form? What causes earthquakes? Can we predict them? Why or why not? How do tsunamis form?
- What are the different drainage patterns for river systems? How do flowing water and ice sculpt the landscape? How does the generation of hydroelectricity change the characteristics of flowing rivers?
- What is groundwater, why is it important to humans, and what are the implications of groundwater contamination?
- What has Earth's climate been like in the past, and how might the climate change in the future? What are the greenhouse effect and ocean acidification? What is the carbon cycle, and why is it important?
- What are the differences between non-renewable, renewable, and perpetual natural resources? What is the supply versus demand for water, petroleum, coal, minerals, and other natural resources? What are the pros and cons of various energy sources including nuclear, solar, wind, geothermal, hydroelectric, and carbon-based fuels?

Features

The Earth Science and Geography Department has a map library containing several thousand map sheets. The department also has two dedicated computer laboratories, the Earth Sciences Spatial Analysis Laboratory (ESSAL) which acts as a center for remote sensing and GIS-based research projects, and a teaching laboratory that provides computer-based teaching with an emphasis on geotechniques. These labs provide sophisticated image processing and spatial analysis software as well as libraries of satellite imagery and spatial databases. There is also a climate research laboratory with specialized equipment for analyzing tree rings and cave deposits. Additional equipment includes Global Positioning System (GPS) receivers and advanced instruments for field data collection.

The faculty have expertise in plate tectonics, historical geology, and field geology; hydrology, atmospheric science, air quality, climate change, and landscape change; geographic information systems, remote sensing, and sensor networks, plus urban planning, environmental planning, and environmental science. The broad expertise of the faculty provides an

unusual opportunity for motivated undergraduate students to work closely with their professors and gain "hands-on" experience within domestic and international research projects.

Academic Advisement

Majors should consult with their advisor prior to registration each semester. Records of student progress toward the degree are accessible online through MyCSUDH. Students should check their progress regularly.

Preparation

For high school students, the best preparation for the Earth Science major is a well-rounded program of high school courses in humanities, four years of natural sciences, mathematics, and written and oral communication.

Community college transfer students should have completed an introductory course in geology or physical geography. Other introductory courses in the physical or biological sciences, including field courses, are encouraged.

Graduation With Honors

An undergraduate student may be a candidate for graduation with Honors in Earth Science provided they meet the following criteria:

1. A minimum of 36 units in residence at CSU Dominguez Hills;
2. A minimum grade point average of at least 3.5 in all courses used to satisfy the upper-division requirements in the major;
3. Recommendation by the faculty of the Earth Science and Geography Department.

Career Possibilities

The Earth Science major prepares students for a wide range of employment opportunities within government, industry and nonprofit organizations. Specific fields include environmental protection and consulting; natural resource management; air and water quality monitoring; geologic hazards and geotechnical investigations; water supply and power generation utilities. The Earth Science degree also provides excellent preparation for graduate programs.

Students may prepare for a teaching career at a secondary school (middle or high school) by completing an approved "Subject Matter Preparation Program" for Geoscience. Completion of such a program is the first step in meeting the state requirements for a teaching credential. As the program requirements for the Subject Matter Preparation Program routinely change, interested students should consult with the appropriate advisor for current information.

Undergraduate Programs

Bachelor

- Earth Science, Bachelor of Science (<https://catalog.csudh.edu/academics/earth-science/earth-science-bs/>)

Minor

- Earth Sciences, Minor (<https://catalog.csudh.edu/academics/earth-science/earth-sciences-minor/>)

Faculty

John Keyantash, Department Chair

Parveen Chhetri, Tianjun Lu, Brendan McNulty, Ashish Sinha

Instructional Support Tech Office: LIB 1114, (310) 243-3368
Department Office: NSM B-202, (310) 243-3377

Emeriti Faculty

Rodrick Hay, Ralph Saunders, David Sigurdson, Jamie Webb

Courses

EAR 100. Physical Geology. (3 Units)

Prerequisite: Concurrent enrollment in EAR 101 is recommended. Volcanoes, earthquakes, oceanic processes and continental drift. Rock and mineral identification is enhanced by concurrent enrollment in EAR 101. Meets certain general studies requirements, is fundamental to the Geology major, and has wide-ranging applications in art, commerce, public policy, and science. Field Trip.
Offered Fall, Spring

EAR 101. Physical Geology Laboratory. (1 Units)

Prerequisite: Concurrent enrollment in EAR 100 is recommended. Nature and origin of rocks and minerals through determination of physical properties of specimens. Topographic and geologic map analysis. Geological features from stereoscopic air photos. Recommended elective for students interested in the outdoors, archaeology, mineral deposits, land use, and natural hazards.
Offered Fall, Spring

EAR 200. Earth History & Evolution. (3 Units)

Prerequisite: EAR 100, EAR 101, and concurrent enrollment in EAR 201. Geological and biological history of the earth. Includes development of the geologic time scale, origin of the Earth and life, the fossil record and evolution, and plate tectonics. Special emphasis on the geology of North America. Philosophical implications make this a valuable general elective for all students.
Offered Spring even

EAR 201. Earth History Lab. (1 Units)

Prerequisite: Concurrent enrollment in EAR 200. Practical laboratory experience in fossil identification. Life history, form, function and evolution of animals and plants important in the fossil record. Interpretation of geologic maps and stratigraphic correlation of sedimentary rocks. Three hours of laboratory per week.
Offered Spring even

EAR 312. Natural Disasters. (3 Units)

Prerequisite: Completion of lower division General Education. Examines the impact of natural events on human activities and vice versa. Mankind's uneasy relationship with atmosphere, oceans and not-so-solid Earth. Examines the study of earthquakes, volcanoes, floods, landslides, tsunamis, climate change, hurricanes, tornadoes, and wildfires.
Offered Fall, Spring, Summer

EAR 370. The World Ocean. (3 Units)

Prerequisite: EAR 100 or GEO 200 is recommended. Physical and chemical characteristics of seawater. Distribution of temperatures and salinity. Study of currents, tides, waves and the influence of the sea on weather and on life.
Offered Spring odd

EAR 376. Field Mapping. (3 Units)

Introduction to geological and environmental field mapping. Techniques include working with topographic maps and remotely-sensed images, use of Brunton compass traverse methods, and interpretation of sedimentary rocks and geological structures (faults, folds). Applications to geotechnical work, resource management, environmental analysis, anthropology, government agencies, industry, and teaching outdoor activities. Eight hours of laboratory and one-half hour of lecture per week.

Offered Spring even

EAR 410. Environmental Geology. (3 Units)

Study of human interaction with the geologic environment. Mitigating exposure to geological hazards (earthquakes, volcanic eruptions, landslides); environmental consequences of geological resource (fossil fuels, minerals, water) extraction and consumption; surface and groundwater contamination; acid rain; climate change; waste burial.
Offered Spring odd

EAR 416. Earth Sciences for Teachers. (3 Units)

Prerequisites: Completion of lower division General Education. Study of planet Earth including such topics as geology, volcanoes, earthquakes, fossils, oceanography, weather, and astronomy as appropriate for elementary and junior high school teachers. Two hours of lecture and three hours of laboratory per week.
Offered Fall, Spring, Summer

EAR 450. Plate Tectonics and the Rock Cycle. (4 Units)

Study of plate tectonic processes and how they relate to the formation of rocks and the rock cycle. Includes earthquakes, volcanic activity, hot spots and plate boundary types.
Offered Fall even

EAR 460. Global Change. (3 Units)

An interdisciplinary introduction to the science of understanding global change natural as well as anthropogenically induced. Key topics include the physical climate system and its variability, the carbon cycle, land and water issues, and the impact of global change on society.
Offered Fall even

EAR 476. Groundwater. (3 Units)

Prerequisites: EAR 100 and EAR 101. CHE 108 or CHE 110 is recommended. Interrelationships of geologic materials and processes with water. Topics include: hydrologic cycle, physical characteristics of aquifers, groundwater flow, wells, geology of flow systems, groundwater chemistry, and criteria for development and management of water resources.
Offered Fall even

EAR 478. Engineering Geology. (3 Units)

Prerequisite: EAR 450. Evaluation and abatement of geologic hazards affecting construction projects and land use. Landslides, groundwater pollution, subsidence, flooding, and earthquake effects. Mechanical properties of rocks and soils. Case histories and site investigations. Application to business, law, construction engineering and environmental studies. Two hours of lecture and three hours of laboratory per week.
Offered Infrequent

EAR 490. Sr Sem In Earth Sciences. (1 Units)

Prerequisite: Senior standing in Earth Sciences or consent of instructor. Study and discussion of current research in Earth Sciences. Techniques of oral presentation, library research and preparation of audiovisual materials. One hour of seminar per week.
Offered Infrequent

EAR 494. Independent Study. (1-3 Units)

Prerequisite: Consent of instructor. Independent Study of a particular geographic or environmental problem under the supervision of a member of the Geography staff.

Offered Fall, Spring

EAR 495. Advanced Top In Ear Sci. (3 Units)

Selected topics in Earth Science with course content to be determined by instructor. Repeatable course.

Offered Spring

EAR 496. Internship In Earth Sci. (1-3 Units)

Prerequisite: Consent of instructor. Employment as an assistant or volunteer in an earth sciences-related firm or government agency.

Course may run at time convenient to student and employers, including summer. Student should contact Department faculty three months prior to enrollment. CR/NC grading. Repeatable course.

Offered Fall, Spring

EAR 498. Directed Research. (1-3 Units)

Prerequisite: Consent of instructor. Directed research of a particular geographic or environmental problem under the direction of a member of the Earth Science staff.

Offered Fall, Spring

EAR 499. Senior Thesis. (2 Units)

Prerequisite: Approval of instructor. Geological research and writing of a thesis. Generally includes library, field and laboratory investigations.

Topic of research to be approved and directed by an instructor. CR/NC grading.

Offered Infrequent