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your  
**Earth!**

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**GRADUATE**  
courses  
**202021**



**EARTH AND ATMOSPHERIC SCIENCES**

# 500 level

## 500-Level Graduate Courses

**EAS G513 Seismology** 3 credits. Earthquakes, propagation of elastic waves, interpretation of seismological data, theory of seismological instruments.

**EAS G514 Geophysical Signal Analysis** 3 credits. Construction, analysis, and interpretation of geophysical signals. Filter theory, spectral analysis, signal-to-noise enhancement, transform theory, seismic wave propagation, computer applications.

**EAS G535 Quaternary Geology** 3 credits. Pleistocene and recent deposits; stratigraphy and chronology; formation of associated landforms, landscapes, paleosols, and soils; Quaternary environments.

**EAS G544 Methods in Analytical Geochemistry** Designed as an overview of basic collection and preparation of water, soil, and rock samples by analytical geochemical techniques used in environmental, exploration geology and geochemical studies.

**EAS G548 Sustainable Energy Systems** 3 credits. Examination of current energy use and the role of renewable energy resources in meeting future demand.

**EAS G550 Surface Water Hydrology** 3 credits. Mechanics of surface runoff and open channel flow. Rainfall-runoff equations, probability analysis of stream flow, and watershed simulation models.

**EAS G554 Fundamentals of Plate Tectonics** 3 credits. Synthesis of observations from diverse disciplines of geology leading to the development of modern plate tectonic theory.

**EAS G571 Principles of Petroleum Geology** 3 credits. Origin, geochemistry, migration, and accumulation of petroleum; reservoir rocks; types of entrapment; exploration procedures and their rationale; methods and devices for data gathering and detection.

**EAS G576 Climate Change Science** 3 credits. Evidence for and theories of climate change over a range of time scales.

**EAS G583 Isotope Geochemistry** 3 credits. Introduction to the theory and application of radiogenic and stable isotopes to a variety of subdisciplines in the Earth sciences.

**EAS G586 Geochemical Modeling** 3 credits. Introduces students to the theories and applications of geochemical modelling.

**EAS G587 Organic Geochemistry** 3 credits. Application of organic geochemical methods in determining origins of fossil fuels and in defining biological and environmental histories of rocks.

**EAS G589 Geomicrobiology** 3 credits. Introduction to the diversity and physiology of microbes in soil, sediment, lake, ocean and groundwater environments.

*Note: this represents a sampling of course offerings in EAS. Please visit <https://earth.indiana.edu/student-portal/graduate/courses/grad-course-list.html> to get a complete list.*

## 500-Level Courses for Atmospheric Science

**EAS G534 Dynamic Meteorology: Synoptic to Global Scale** 3 credits. Introduction to dynamical processes and analysis in the atmosphere.

**EAS G537 Synoptic Meteorology and Climatology** 3 credits. Analysis and prediction of synoptic scale weather systems, emphasizing the mid-latitudes.

**EAS G538 Air Pollution Meteorology** 3 credits. Analysis of the physical laws that govern the transport, transformation, and removal of atmospheric pollutants.

**EAS G540 Physical Meteorology and Climatology** 3 credits. Introduced to the physical processes and properties of the atmosphere.

**EAS G556 Wind Power Meteorology** 3 credits. The science of wind power meteorology will be explained with a focus on practical elements of how to measure wind resources, estimate wind turbine loads and wind turbine siting.

**EAS G564 Dynamic Meteorology: Boundary-Layer Meteorology** 3 credits. Basic meteorological theory for processes in the atmospheric boundary-layer that scale from the microscale to the mesoscale.

**EAS G570 Micrometeorology** 3 credits. Atmospheric processes at the micro and local scale.

**EAS G594 Numerical Weather Prediction** 3 credits. This course covers the conceptual foundations of techniques that are commonly used in numerical weather prediction for atmospheric and oceanic modeling.

# 400 level

## 400-Level Courses that Carry Graduate Credit

**EAS E404 Geobiology** 3 credits. Geobiology is the application of biological principals and fossils to the study of earth history.

**EAS E406 Introduction to Geochemistry** 3 credits. Chemistry in the study of the earth, employing elementary chemical thermodynamics, the phase rule, chemical equilibria, redox reactins, the radioactive decay law, and organic chemistry.

**EAS E411 Invertebrate Paleontology** 3 credits. Application of biological principles and use of fossils in the study of Earth's history; origin of life and the early fossil record; evolution; approaches of taxonomy; chemistry of fossils; ecology of ancient life; use of fossils to measure geologic time.

**EAS E412 Introduction to Vertebrate Paleontology** 2-3 credits. Fossil record, comparative morphology, phylogeny, biogeography, and paleoecology of the major vertebrate groups.

**EAS E415 Principles of Geomorphology** 3 credits. Natural processes that form landscapes, surficial geologic materials and soils. Physics and chemistry of weathering.

# 400 level

**EAS E416 Economic Geology** 3 Credits. Geologic occurrence and genesis of economic mineral deposits, including petroleum and coal.

**EAS E417 Optical Mineralogy** 3 credits. Use of crystal optics and the petrographic microscope to identify minerals, textures, rocks, and mineral reactions in thin sections of rock.

**EAS E418 Igneous and Metamorphic Petrology** 3 credits. The petrogenesis of igneous and metamorphic rocks.

**EAS X420 Regional Geology Field Trip** 1-2 credits.

**EAS E423 Methods in Applied Geophysics** 4 credits. Application of geophysical principles to field and laboratory experiments, with emphasis on data acquisition, analysis, and geologic interpretation.

**EAS E427 Introduction to X-Ray Mineralogy** 3 credits. Theory and practice of X-ray powder diffraction.

**EAS E451 Principles of Hydrogeology** 3 credits. Physical and chemical properties of water; chemical equilibria and stable isotopes in groundwaters; acid drainage, landfills, and agricultural pollution.

## summer field courses

**EAS X429 Field Geology in the Rocky Mountains** 6 credits. Six weeks, including five weeks at the Geologic Field Station in Montana. Geologic reconnaissance, measurement of stratigraphic sections, mapping on aerial photographs, construction of structure sections.

**EAS X428 Field Geology Fundamentals in Montana and Wyoming**, a 5-week, 5-credit face-to-face field course based out of the IUGFS facility in SW Montana.

**EAS X498** – a 1-week, 1-credit face-to-face subdiscipline concentration course based out of the IUGFS facility in SW Montana. There are five subdisciplines to choose from.

**EAS G549 Field Geology and Paleoanthropology in Tanzania** 6 credits. Hands-on experience in field geology and paleoanthropology of the Olduvai Gorge site situated on the flanks of East African Rift Valley in northern Tanzania.

IU Earth and Atmospheric Science graduates are highly regarded and actively recruited by industry, government and other academic institutions. Our network of alumni has a tradition of helping graduates find and secure the jobs they seek.

If you are interested in more information about graduate studies, contact Doug Edmonds, the Graduate Advisor, at 812-855-4512 or [edmondsd@indiana.edu](mailto:edmondsd@indiana.edu). For information about Field Station courses, contact Dr. Jim Handschy, Executive Director, IU Geologic Field Station, [jwhandsc@iu.edu](mailto:jwhandsc@iu.edu).