

Earth and Environmental Science (EES)

Courses

EES 5011. Remote Sensing and GIS. 4 Credit Hours.

The focus of this class is on remote sensing technologies and geographic information systems. Remote sensing is a dynamic field; new, high-resolution satellites are coming on line almost daily, and there has been an exponential growth in applications of remote sensing data during the past decade, including: mineral exploration, precision agriculture, watershed management, land use classification, military intelligence, and climate monitoring. By the end of the semester you will have a fundamental understanding of the uses and limitations of remote sensing data for environmental applications, and a thorough familiarity with geographic information systems.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

EES 5042. Coastal Processes. 4 Credit Hours.

The course will apply a process geomorphological approach to understanding coastal behavior, including global distribution of coasts, wave and tidal hydrodynamics, nearshore and aeolian sediment transport, and morphological signatures of extreme events.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

EES 5101. Structural Geology (Graduate). 4 Credit Hours.

The purpose of this course is to train students in the concepts and techniques of structural geology. Students will learn how to collect, analyze, and interpret geologic data drawn from a variety of disciplines pertinent to structural geology and present a cohesive analysis and interpretation of these results. Results are presented as maps, reports, and computer models. A hypothesis driven term project will be conducted by the graduate student on a topic in structural geology. NOTE: This course differs from the undergraduate version EES 4101 through graduate specific laboratory and exam questions, readings, and the term project.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

EES 5401. Analytical Methods in Mineralogy. 4 Credit Hours.

An introduction to the theory and application of X-ray diffraction and spectroscopic techniques for analysis of mineralogical samples. Students will learn the theory underpinning these methods, acquire skills in instrument operation, and apply these skills to research-relevant problems such as phase identification, site occupancy, chemical analysis, and planetary surface studies. Techniques discussed include powder X-ray diffraction, visible, Raman, and infrared spectroscopy, and synchrotron-based X-ray spectroscopic and scattering techniques.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

EES 5402. X-ray Crystallography. 4 Credit Hours.

Generation and use of x-rays for diffraction analysis; Analysis of clays and related minerals by x-ray diffraction; Crystal structure patterns and biogeochemical groups.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

EES 5406. Nanoscience and the Environment. 4 Credit Hours.

Nanotechnology has developed rapidly in the past decade, yet our knowledge of its environmental impact, particularly regarding the fate and behavior of nanomaterials in the environment, lags far behind. This course will cover a range of topics concerning nanomaterials in the environment, ranging from the unique size-dependent properties of nanomaterials to their applications in environmental remediation. The lab component of this course will include nanomaterial synthesis and characterization; nanomaterial transport, aggregation, deposition, transformation, and persistence in natural settings; environmental applications of nanomaterials; and nanomaterial characterization techniques, particularly electron microscopy.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

EES 5434. Ecohydrology. 3 Credit Hours.

Hydrological and ecological processes are tightly interrelated, with vegetation affecting the hydrological cycle, and hydrologic partitioning of the water budget affecting vegetation dynamics. This course builds on perspectives from ecology, hydrology, and soil science to focus on the emerging, interdisciplinary area of ecohydrology - the science that studies mutual interaction between the hydrological cycle and ecosystems. The first part of the course will deal with fundamental processes controlling the flow of water in the biosphere (in land, atmosphere, soil and plants) and the interactions with ecological processes and human dimensions at different scales. The second part will deal with the implications of ecohydrological feedbacks, covering a broad range of issues including global environmental change, land use change, global desertification/land degradation, urbanization, soil erosion, and the food-energy-water nexus. The concepts and principles discussed in the class will have broad applications ranging from finding innovative solutions to ecosystem degradation and food security, and designing global change responses.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

EES 5454. Introduction to Geophysics. 4 Credit Hours.

An introduction to gravity, magnetic, electromagnetic, and seismic exploration methods. Applications include environmental characterization, oil and mineral exploration, geotechnical engineering, and archeology.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

EES 5461. Low-Temperature Geochemistry. 4 Credit Hours.

Principles of aqueous geochemistry discussed within the framework of geologic processes. One or two field trips.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

EES 5462. Advanced Low-Temperature Geochemistry. 3 Credit Hours.

Study and discussion of topics in aqueous and sedimentary geochemistry.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

EES 5502. Glaciology. 3 Credit Hours.

This course presents the basic physical principles governing natural processes occurring to and within glaciers and ice sheets on Earth, and how they interact with the surrounding environment. The following major topics will be covered during the course: 1) the deformation and flow of ice; 2) energy transfer within ice and energy exchanges with the surroundings; and 3) ice geomorphic processes.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

EES 5601. Vertebrate Paleontology and Taphonomy. 3 Credit Hours.

This course examines vertebrate fossils and their importance for interpreting and reconstructing terrestrial ecosystems. Students will learn the basics of vertebrate skeletal anatomy, interpret transport and depositional histories of skeletal elements and assemblages, and combine this information with geologic data to reconstruct paleoenvironmental settings and paleocommunity associations. Several class sessions will meet off-campus at local museums; one weekend field trip is required.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

EES 5625. Electron Optical Techniques. 4 Credit Hours.

This course will introduce the microanalytical and imaging methods of electron optical instruments such as the Electron Probe Microanalyzer (EPMA) and the Scanning Electron Microscope (SEM). The theory and operation of the instruments will be covered as will the interpretation of images and analytical results.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

EES 5702. Sedimentary Petrology. 4 Credit Hours.

This course explores the basic composition and texture of sedimentary rocks in order to understand depositional environment and provenance. This course focuses on sedimentation mechanics, petrography, and diagenesis. Includes a lab.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

EES 5725. Soils and Paleosols. 4 Credit Hours.

The course is divided into two parts: modern soils and paleosols. The goals of this course are to teach students the fundamentals of modern soil genesis and classification in order to interpret ancient soils preserved in the rock record (paleosols), and to incorporate models of soil genesis into the traditional geology paradigm. Students will be exposed to a combination of laboratory methods and field work.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

EES 5801. Quantitative Structural Geo. 4 Credit Hours.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

EES 5802. Tectonics. 3 Credit Hours.

Plate tectonic theory. Structure and geometry of lithospheric plates; mechanisms of divergent, transform and convergent boundaries; subduction; obduction; mantle plumes; large igneous provinces; large sedimentary basins and Phanerozoic orogenic belts.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

EES 5811. Planetary Geology. 4 Credit Hours.

This course explores the modern and ancient geologic processes on other planets and discusses how studies of other planets can aid us in a better understanding of our Earth. The course will also cover topics such as planetary exploration and astrobiology. Includes a lab.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

EES 8000. Geology Seminar. 1 Credit Hour.

Required of M.A. students. Visiting specialists in a wide variety of geologic fields will lecture and discuss their research.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may be repeated for additional credit.

EES 8082. Independent Study Program. 1 to 3 Credit Hour.

Limited to Geology graduate students with permission from the department.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may be repeated for additional credit.

EES 8200. Graduate Geology Seminar. 3 to 6 Credit Hours.

Advanced seminar course; subject matter varies from semester to semester. The educational objectives of the course are to focus on current issues at the interfaces of geological processes through advanced technological methods of analysis.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may be repeated for additional credit.

EES 8411. Advanced Hydrogeology. 3 to 4 Credit Hours.

This course is typically offered in Spring.

This course covers water resources with an emphasis on groundwater. Topics include quantifying groundwater flow, groundwater-surface water interactions, contaminant transport, and a brief introduction to modeling. Problem sets and labs are used to develop specific skills, including field techniques.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

EES 8421. Groundwater Modeling. 3 Credit Hours.

This course offers students a chance to construct models using well known codes such as MODFLOW and other practical tools. The goals of this course are: learn tools for groundwater flow modeling, be able to recognize how to judge models and compare them with reality, and gain computer skills that can be used with a wide variety tools.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

EES 8701. High Temperature Reactions. 4 Credit Hours.

Thermodynamic laws and theory are used to discuss igneous and metamorphic processes. Exact field relationships are combined with thermodynamics to solve applied petrologic problems.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

EES 8706. Regional Geology. 3 Credit Hours.

Discussion of the geologic history and tectonics of selected regions.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

EES 8711. Economics of Geo Ore Deposits. 3 Credit Hours.

Study of the geology, origin, distribution, economics and extraction methods of major classes of ore deposits.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

EES 8911. Teaching of Geology. 0 to 1 Credit Hours.

Required of all teaching assistants in their first semester of teaching. Instruction and evaluation of teaching laboratory, or discussion sections.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may be repeated for additional credit.

EES 9991. Master's Research Projects. 1 to 6 Credit Hour.

Short-term, limited research project or laboratory project in the field. This course is not the capstone project course, nor can it be used for thesis based research. The course is for master's students only, including PSM, MA or MS. This class will not confer full-time program status unless nine credits are taken.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Degree Restrictions: Must be enrolled in one of the following Degrees: Master of Arts, Master of Science, Prof Science Masters.

Repeatability: This course may be repeated for additional credit.

EES 9993. Comprehensive Examination Prep. 1 Credit Hour.

This 1-credit seminar is designed to prepare students for the MS Comprehensive Exam given at the end of this course, ensuring a fundamental grounding in Earth Science. Students will study material covered in the exam including hydrogeology, geophysics, sedimentology/stratigraphy, earth history, geomorphology, structural geology, GIS, geochemistry, mineralogy and petrology. MS students will take this course in the Spring semester of their first year.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

EES 9994. Preliminary Examination Preparation. 1 to 6 Credit Hour.

This course is required for students who are preparing for the preliminary or candidacy examination. Students should enroll after coursework is completed or when preparing for the candidacy exam until the time that the preliminary or candidacy examination is completed. This course will confer full-time status at the minimum credit hour registration limit of one credit. All students must complete a minimum of one credit of this course. Students must complete a total of 6 credit hours of 9994, 9998 and 9999.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Degree Restrictions: Must be enrolled in one of the following Degrees: Doctor of Philosophy.

Repeatability: This course may be repeated for additional credit.

EES 9995. Capstone Project. 1 to 6 Credit Hour.

Capstone project for master's students including students in PSM, MA or MS. This class will provide full-time status. Students in PSM programs need to register for at least one credit of this course to fulfill program requirements. Additional credits may be required for specific programs. This course will confer full-time status at the minimum credit hour registration limit of one credit.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Degree Restrictions: Must be enrolled in one of the following Degrees: Master of Arts, Master of Science, Prof Science Masters.

Repeatability: This course may be repeated for additional credit.

EES 9996. Master's Thesis Research. 1 to 6 Credit Hour.

Course for master's thesis research. Only intended for students in thesis bearing master's programs. A minimum of one credit is required. This course will confer full-time status at the minimum credit hour registration limit of one credit.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may be repeated for additional credit.

EES 9998. Pre-Dissertation Research / Elevation to Candidacy. 1 to 6 Credit Hour.

This course is intended for students who are performing research prior to candidacy. Students can register for this course after required courses are completed. This course will confer full-time status at the minimum credit hour registration limit of one credit. Students must be registered for this course during the semester that they are to be elevated to candidacy examination. Students must complete a total of 6 credit hours of 9994, 9998 and 9999.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Degree Restrictions: Must be enrolled in one of the following Degrees: Doctor of Philosophy.

Repeatability: This course may be repeated for additional credit.

EES 9999. Dissertation Research. 1 to 6 Credit Hour.

The course is for Ph.D. students who have been elevated to candidacy. During the course of their candidacy students must complete a minimum of two credits of dissertation research. This course will confer full-time status at the minimum credit hour registration limit of one credit. Students must complete a total of 6 credit hours of 9994, 9998 and 9999.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Degree Restrictions: Must be enrolled in one of the following Degrees: Doctor of Philosophy.

Student Attribute Restrictions: Must be enrolled in one of the following Student Attributes: Dissertation Writing Student.

Repeatability: This course may be repeated for additional credit.