Earth & Environmental Science (EES)

Courses

EES 0836. Disasters: Geology vs. Hollywood. 3 Credit Hours.
This course is typically offered in Fall, Spring, and Summer I.
Clips from Hollywood disaster movies will drive our inquiry into geologic phenomena. Can you really drive over a lava flow in a jeep? (Dante's Peak) Are we foolish not to prepare for a major earthquake in New York City? (Aftershock) Could global warming melt the polar ice caps turning "dry land" into a myth? (Waterworld) Would the impact of an asteroid the "size of Texas" kill half the Earth by heat and freeze the remainder in a nuclear winter? (Armageddon) Learn the fundamentals of plate tectonics, how petrologic properties control volcanic explosivity, how to calculate earthquake locations from seismic data, and prepare a disaster readiness plan for a major U.S. city. NOTE: This course fulfills a Science & Technology (GS) requirement for students under GenEd and Science & Technology Second Level (SB) for students under Core.
Course Attributes:
GS
Repeatability: This course may not be repeated for additional credits
Pre-requisites:
MATH 0701 to 0702| Required Courses:1|Minimum Grade of C|May not be taken concurrently
OR MATH 0800 to 4999| Required Courses:1|Minimum Grade of C-|May be taken concurrently.

EES 0837. Evolution & Extinctions. 3 Credit Hours.
This course is typically offered in Fall, Spring, and Summer I.
Basic geologic principles and the fundamentals of evolutionary thought combine to bring to life the 4.5 billion year story of our planet and its creatures. Through hands-on experience with fossils and rocks, students discover how to decipher past environments from the geologic record and investigate changes in life through time. You may have read that an asteroid impact wiped out the dinosaurs, but can "natural" Earth-based processes also cause mass extinctions? Should we be less worried about rocks from space, and more about "down to Earth" phenomena such as climate change? NOTE: This course fulfills a Science & Technology (GS) requirement for students under GenEd and Science & Technology Second Level (SB) for students under Core.
Course Attributes:
GS
Repeatability: This course may not be repeated for additional credits
Pre-requisites:
MATH 0701 to 0702| Required Courses:1|Minimum Grade of C|May not be taken concurrently
OR MATH 0800 to 4999| Required Courses:1|Minimum Grade of C-|May be taken concurrently.

EES 0842. Sustainable Environments. 3 Credit Hours.
This course is typically offered in Fall, Spring, and Summer II.
Americans account for over a quarter of all fossil fuel consumption, own more cars than there are licensed drivers, and build new homes 40 percent larger than they did in 1975, despite shrinking household size. We feel for the pandas and polar bears, while contributing mightily to global climate change, resource inequity, and ecosystem destruction. How do we reckon with environmental crises at multiple scales, from the neighborhood to the atmosphere and oceans? "Think globally, act locally" environmentalists admonish us! Direct our vast human ingenuity and collective spirit toward technologies and behaviors that bring peace with the planet. Course mission: enhance your capability to make informed choices, based on a sound understanding of the ecological, technological, economic, political, and ethical dimensions of environmental sustainability. NOTE: This course fulfills a Science & Technology (GS) requirement for students under GenEd and Science & Technology Second Level (SB) for students under Core. Students cannot receive credit for this course if they have successfully completed GUS 0842 or ENST 0842.
Course Attributes:
GS
Repeatability: This course may not be repeated for additional credits
Pre-requisites:
MATH 0701 to 0702| Required Courses:1|Minimum Grade of C|May not be taken concurrently
OR MATH 0800 to 4999| Required Courses:1|Minimum Grade of C-|May be taken concurrently.

EES 0854. Geology of the National Parks. 3 Credit Hours.
This course is typically offered in Fall and Spring.
The primary purpose of the National Park Service is to preserve areas of natural or cultural interest for current and future generations. Quite commonly these areas of interest, such as the Grand Canyon, or Yellowstone National Park, are the result of extreme geologic forces which have shaped the landscape. The goal of this class is to use geologic principles to understand the "science of the scenery" of individual parks. Students will also address key issues within individual parks, such as the competing interests of visitor access vs. land management, the societal need for natural resources, and the preservation of unique or delicate ecosystems. NOTE: (1) This course fulfills a Science & Technology (GS) requirement for students under GenEd and Science & Technology Second Level (SB) for students under Core. (2) Students cannot receive credit for this course if they have successfully completed EES 0954.
Course Attributes:
GS
Repeatability: This course may not be repeated for additional credits.
EES 0954. Honors Geology of the National Parks. 3 Credit Hours.
This course is typically offered in Fall.
The primary purpose of the National Park Service is to preserve areas of natural or cultural interest for current and future generations. Quite commonly these areas of interest, such as the Grand Canyon, or Yellowstone National Park, are the result of extreme geologic forces which have shaped the landscape. The goal of this class is to use geologic principles to understand the "science of the scenery" of individual parks. Students will also address key issues within individual parks, such as the competing interests of visitor access vs. land management, the societal need for natural resources, and the preservation of unique or delicate ecosystems. NOTE: (1) This course fulfills a Science & Technology (GS) requirement for students under GenEd and Science & Technology Second Level (SB) for students under Core. (2) Students cannot receive credit for this course if they have successfully completed EES 0854. (3) This is an Honors course.

Cohort Restrictions: Must be enrolled in one of the following Cohorts: SCHONORS, UHONORS, UHONORSTR
Course Attributes: GS, HO
Repeatability: This course may not be repeated for additional credits.

EES 1001. Introductory Geology. 4 Credit Hours.
This course is typically offered in Fall, Summer I and Summer II.
An introduction to the basic principles and processes of geology. Wide range of topics, including rocks and minerals, surface processes, plate tectonics, and the earth's interior. NOTE: This course can be used to satisfy the university Core Science & Technology First Level (SA) requirement. To determine if this course in combination with another course can satisfy the GenEd Science & Technology requirement, see your advisor.

Course Attributes: SA
Repeatability: This course may not be repeated for additional credits
Pre-requisites:
MATH 0701 to 0702 | Required Courses:1 | Minimum Grade of C- | May not be taken concurrently
OR MATH 0800 to 4999 | Required Courses:1 | Minimum Grade of C- | May be taken concurrently
OR MC3 Y | May not be taken concurrently
OR MC4 Y | May not be taken concurrently
OR MC5 Y | May not be taken concurrently
OR MC6 Y | May not be taken concurrently
OR STAT 1001 | Minimum Grade of C- | May be taken concurrently
OR STAT 1102 | Minimum Grade of C- | May be taken concurrently
OR STAT 1902 | Minimum Grade of C- | May be taken concurrently.

EES 2001. Physical Geology. 4 Credit Hours.
This course is typically offered in Fall, Spring, and Summer I.
Introductory geology course designed for geology and environmental science majors and focused on theory and concepts needed for advanced study. Laboratory sessions (3 hrs/week) focus on the properties of mineral and rock specimens, map skills, and the development of basic field techniques.

Repeatability: This course may not be repeated for additional credits
Pre-requisites:
MATH 0701 to 0702 | Required Courses:1 | Minimum Grade of C- | May not be taken concurrently
OR MATH 0800 to 4999 | Required Courses:1 | Minimum Grade of C- | May be taken concurrently
OR MC3 Y | May not be taken concurrently
OR MC4 Y | May not be taken concurrently
OR MC5 Y | May not be taken concurrently
OR MC6 Y | May not be taken concurrently
OR MA01 Y | May not be taken concurrently
OR STAT 1001 | Minimum Grade of C- | May be taken concurrently
OR STAT 1102 | Minimum Grade of C- | May be taken concurrently
OR STAT 1902 | Minimum Grade of C- | May be taken concurrently.

EES 2011. Mineralogy I. 4 Credit Hours.
This course is typically offered in Fall.
Fundamentals of hand-specimen analysis including crystallography, bonding, physical properties, chemical composition and growth of common minerals.

Repeatability: This course may not be repeated for additional credits
Pre-requisites:
(EES 2001 | Minimum Grade of C- | May not be taken concurrently)
AND (CHEM 1031 | Minimum Grade of C- | May be taken concurrently)
OR CHEM 1041 | Minimum Grade of C- | May be taken concurrently
OR CHEM 1951 | Minimum Grade of C- | May be taken concurrently).
EES 2012. Mineralogy II. 4 Credit Hours.
This course is typically offered in Spring.
Microanalysis by polarized light microscopy, powder x-ray diffractometry and microprobe including site occupancy, crystal growth, and microstructural defects with emphasis on silicates.
Repeatability: This course may not be repeated for additional credits
Pre-requisites:
EES 2011|Minimum Grade of C-|May not be taken concurrently.

EES 2021. Facies Models. 4 Credit Hours.
This course is typically offered in Fall and Spring.
Analysis of sedimentological and stratigraphic data to derive facies interpretations. Laboratory and field exercises emphasize data collection, interpretation and graphical presentation. NOTE: Several required day-long field trips.
Repeatability: This course may not be repeated for additional credits
Pre-requisites:
EES 2001|Minimum Grade of C-|May not be taken concurrently.

EES 2022. Paleontology and Stratigraphy. 4 Credit Hours.
This course is typically offered in Spring.
Fundamental concepts of stratigraphy combined with functional/ecological analysis of fossil invertebrates. Two multi-day field trips focused on correlation of strata, paleoecologic analysis, and reconstruction of geologic history. NOTE: Two multi-day (including weekends) field trips are required.
Repeatability: This course may not be repeated for additional credits
Pre-requisites:
EES 2021|Minimum Grade of C-|May not be taken concurrently.

EES 2042. Process Geomorphology. 4 Credit Hours.
This course is typically offered in Fall of odd years.
The course will examine key Earth surface processes and landforms, including the role of tectonic, climatic, and biological agents in landscape evolution and quantitative analysis of morphological elements produced by glaciers, rivers, wind, and marine processes.
Repeatability: This course may not be repeated for additional credits
Pre-requisites:
EES 2001|Minimum Grade of C-|May not be taken concurrently.

EES 2061. Introduction to Geochemistry. 4 Credit Hours.
This course is typically offered in Spring.
Application of chemical principles and quantitative methods to understand and solve various geological problems. Field trips and laboratory exercises will emphasize techniques of obtaining and measuring geological samples. Students will analyze, summarize, and present data in oral and written reports.
Repeatability: This course may not be repeated for additional credits
Pre-requisites:
(EES 2001|Minimum Grade of C-|May not be taken concurrently)
AND (CHEM 1031|Minimum Grade of C-|May be taken concurrently
OR CHEM 1041|Minimum Grade of C-|May be taken concurrently
OR CHEM 1951|Minimum Grade of C-|May be taken concurrently).

EES 2065. Nanogeoscience and Technology. 4 Credit Hours.
This course is typically offered in Fall.
Today, everyone is talking about nanomaterials, even advertisements for consumer products use the prefix "nano" as a keyword for special features. Nanotechnology is one of the most important new technologies of the 21st century. Through this course, history, principles, mechanisms, many exciting phenomena and the processes of nano-scale materials, as well as their applications and environmental impact, will be covered in great detail. The lab component of this course will consist of analyzing nanoparticles in water samples, extracting nanomaterials from consumer products, and monitoring plant growth from soils amended with nanomaterials. Through the course of the lab exercises, students will have hands-on experience on various instruments, including inductively-coupled plasma spectrometry, x-ray diffraction, scanning electron microscopy, and transmission electron microscopy.
Repeatability: This course may not be repeated for additional credits
Pre-requisites:
(EES 2001|Minimum Grade of C-|May not be taken concurrently)
AND (CHEM 1032|Minimum Grade of C-|May be taken concurrently
OR CHEM 1042|Minimum Grade of C-|May be taken concurrently
OR CHEM 1952|Minimum Grade of C-|May be taken concurrently)
AND (CHEM 1034|Minimum Grade of C-|May be taken concurrently
OR CHEM 1044|Minimum Grade of C-|May be taken concurrently
OR CHEM 1954|Minimum Grade of C-|May be taken concurrently).
EES 2096. Climate Change: Oceans To Atmosphere. 4 Credit Hours.
This course is typically offered in Spring.
The major topics in Oceanography will be covered in addition to introducing students to meteorology through the study of the Atmospheric circulation system. These topics will give students a better understanding of climate change and forecasting. The course includes a significant writing project.
Field of Study Restrictions: Must be enrolled in one of the following Fields of study: Environmental Science, Earth & Space Sci with Teachin, Geology, Sec Ed-Science Ed
Course Attributes: WI
Repeatability: This course may not be repeated for additional credits
Pre-requisites:
EES 2001|Minimum Grade of C-|May not be taken concurrently.

EES 2097. Process Geomorphology. 4 Credit Hours.
This course is typically offered in Fall of even years.
The course will examine key Earth surface processes and landforms, including the role of tectonic, climatic, and biological agents in landscape evolution and quantitative analysis of morphological elements produced by glaciers, rivers, wind, and mass-movement processes.
Course Attributes: WI
Repeatability: This course may not be repeated for additional credits
Pre-requisites:
EES 2001|Minimum Grade of C-|May not be taken concurrently.

EES 3011. Remote Sensing and GIS. 4 Credit Hours.
This course is typically offered in Spring of odd years.
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 online 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. The demand for college graduates with experience in this field is growing exponentially as well. By the end of this class you won't be a remote sensing expert, but you will have a fundamental understanding of the uses and limitations of remote sensing data for geologic and environmental applications, as well as fundamental geographic information systems skills. NOTE: Prior to Spring 2009, this course was titled "Use of Microcomputers in Geology."
Class Restrictions: Must be enrolled in one of the following Classes: Junior 60 to 89 Credits, Senior 90 to 119 Credits, Senior/Fifth Year 120+ Credits
Repeatability: This course may not be repeated for additional credits.

EES 3021. Introduction to Hydrology. 4 Credit Hours.
This course is typically offered in Fall.
This course provides an introduction to the science of hydrogeology. Topics include how geology influences groundwater flow and geochemistry, how groundwater and surface water interact, and contamination and remediation issues. Student understanding of groundwater and contaminant movement is developed though a series of take-home problem sets that require basic algebra skills.
Repeatability: This course may not be repeated for additional credits
Pre-requisites:
(EES 2001|Minimum Grade of C-|May not be taken concurrently)
AND (MATH 1021|Minimum Grade of C-|May not be taken concurrently
OR MATH 1022 to 4999| Required Courses:1|Minimum Grade of C-|May be taken concurrently
OR MC5 Y|May not be taken concurrently
OR MC6 Y|May not be taken concurrently
OR STAT 1001|Minimum Grade of C-|May not be taken concurrently
OR STAT 1102|Minimum Grade of C-|May not be taken concurrently
OR STAT 1902|Minimum Grade of C-|May not be taken concurrently).

EES 3042. Coastal Processes and Geomorphology. 4 Credit Hours.
This course is typically offered in Spring.
The course will apply a process geomorphological approach to understanding coastal behavior. Subjects will include the global distribution of coasts, wave and tidal hydraulics, barrier morphodynamics, nearshore and aeolian sediment transport, and morphological signatures of extreme events.
Repeatability: This course may not be repeated for additional credits
Pre-requisites:
EES 2021|Minimum Grade of C-|May not be taken concurrently
OR EES 2042|Minimum Grade of C-|May not be taken concurrently
OR EES 2097|Minimum Grade of C-|May not be taken concurrently.
EES 3091. Research Methods. 3 Credit Hours.
This course is typically offered in Spring.
Research Methods is required for all of the TUteach with Teaching majors. It is one of several content courses specially designed to meet the needs of future teachers. Sections meet two hours per week for non-traditional, interactive lectures and two hours per week for lab. The course is cross-listed in Biology, Chemistry, Earth and Environmental Science, and Physics. The goals of the course are (1) to provide students with the tools that scientists use to solve scientific problems; (2) to give students the opportunity to use these tools in a laboratory setting; (3) to make students aware of how scientists communicate with each other through peer-reviewed scientific literature; and (4) to enable students to understand how scientists develop new knowledge and insights, the most important of which are eventually presented in textbooks and taught in conventional science classes. Students design and carry out four independent inquiries, which they write up and present in the manner that is common in the scientific community. The inquiries incorporate mathematics and the various science disciplines, thus the team of instructors teaching this course have expertise in different disciplines and are available to supervise all students as they work on their inquiries in the lab. The combination of Research Methods and the TUteach course “Perspectives on Science and Mathematics” (Philosophy 2196) provides prospective science and mathematics teachers with an in-depth understanding of how the scientific enterprise works. NOTE: EES 3091 is only available for major credit in the Earth and Space Science with Teaching BS program.

College Restrictions: Must be enrolled in one of the following Colleges: Science & Technology

Repeatability: This course may be repeated for additional credit.

Pre-requisites:
SCTC 1289|Minimum Grade of C-|May not be taken concurrently.

EES 3096. Igneous and Metamorphic Petrology. 4 Credit Hours.
This course is typically offered in Spring.
Understanding of the chemistry, physical properties, global distribution, origin, and identification of igneous and metamorphic rocks. Laboratory work will emphasize mineral and rock identification in both hand sample and using microscopes. Thin section production techniques will be introduced. Term paper and oral presentation required.

Course Attributes: WI

Repeatability: This course may not be repeated for additional credits

Pre-requisites:
EES 2011|Minimum Grade of C-|May not be taken concurrently.

EES 4082. Individual Study Program. 1 to 3 Credit Hour.
This course is typically offered in Fall, Spring, and Summer I.
Individual independent study and research under supervision of a member of the Earth & Environmental Science Faculty. A final written report will be submitted to the faculty member. For further information and details, see the undergraduate advisor. NOTE: Student must have a GPA of 3.25 at the end of the first semester of their junior year.

Repeatability: This course may be repeated for additional credit.

EES 4101. Structural Geology. 4 Credit Hours.
This course is typically offered in Spring.
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 argument. Results are presented as maps, reports, and computer models. NOTE: Geology B.S. Capstone.

Repeatability: This course may not be repeated for additional credits

Pre-requisites:
(EES 2011|Minimum Grade of C-|May not be taken concurrently)
AND (EES 2021|Minimum Grade of C-|May not be taken concurrently)
AND (PHYS 1061|Minimum Grade of C-|May not be taken concurrently)
OR PHYS 2021|Minimum Grade of C-|May not be taken concurrently
OR PHYS 2921|Minimum Grade of C-|May not be taken concurrently).

EES 4200. Topics in Geoscience. 3 Credit Hours.
This course is not offered every year.
This seminar will allow students to study current problems in geology and environmental science. NOTE: Elective for Earth and Environmental Science majors (Geology and Environmental Science). May be taken multiple times (on different topics) with permission of instructor.

Repeatability: This course may be repeated for additional credit.

EES 4210. Topics in Geoscience with Lab. 4 Credit Hours.
This course is not offered every year.
This seminar will allow students to study current problems in geology and environmental science. NOTE: Elective for Earth and Environmental Science majors (Geology and Environmental Science). May be taken multiple times (on different topics) with permission of instructor.

Repeatability: This course may be repeated for additional credit.
EES 4589. Field Geology. 6 Credit Hours.
This course is typically offered in Summer. The purpose of this course is to train students in the techniques and methodologies of field geology. Students will learn how to collect, analyze, and interpret field data across a variety of geologic disciplines. Results are presented as maps, reports, measured sections, and computer models. NOTE: Students take this course through other institutions. The selection of the camp must be approved by the Geology undergraduate advisor.

Class Restrictions: Must be enrolled in one of the following Classes: Junior 60 to 89 Credits, Senior 90 to 119 Credits, Senior/Fifth Year 120+ Credits

Repeatability: This course may be repeated for additional credit.

Pre-requisites:
(EES 2001|Minimum Grade of C-|May not be taken concurrently)
AND (EES 2011|Minimum Grade of C-|May not be taken concurrently)
AND (EES 2021|Minimum Grade of C-|May not be taken concurrently)
AND (EES 4096|Minimum Grade of C-|May not be taken concurrently
OR EES 4101|Minimum Grade of C-|May not be taken concurrently).

EES 4696. Vertebrate Paleontology and Taphonomy. 3 Credit Hours.
This course is typically offered in Fall of odd years. 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.

Course Attributes: WI

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

Pre-requisites:
EES 2022|Minimum Grade of C-|May not be taken concurrently.

EES 4811. Planetary Geology. 4 Credit Hours.
This course is typically offered in Fall of even years. 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.

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

Pre-requisites:
(EES 2061|Minimum Grade of C-|May not be taken concurrently
OR EES 3096|Minimum Grade of C-|May not be taken concurrently)
AND (MATH 1041|Minimum Grade of C-|May not be taken concurrently
OR MATH 1941|Minimum Grade of C-|May not be taken concurrently
OR MATH 1042|Minimum Grade of C-|May be taken concurrently
OR MATH 1942|Minimum Grade of C-|May be taken concurrently
OR MATH 1951|Minimum Grade of C-|May be taken concurrently
OR MATH 2043 to 3080| Required Courses:1|Minimum Grade of D|May be taken concurrently).

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 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 biogeofunctional 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. Environmental Nanogeoscience. 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 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 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. 4 Credit Hours.
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 8434. Ecohydrology. 4 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 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 laboratory sections will provide an opportunity to familiarize with the ecohydrological field techniques and offer a forum for critical review of current scientific literature. 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 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 9996. Master's Research and Thesis. 1 to 6 Credit Hour.
The research topic and plan must be approved by the graduate advisor and the instructor who is to supervise the thesis, at least two months before the research is to begin.
Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate
Repeatability: This course may be repeated for additional credit.