GEOSCIENCE (GEOSCI)

GEOSCI 100 — INTRODUCTORY GEOLOGY: HOW THE EARTH WORKS
3 credits.

Geologic processes; structure and history of the earth; earthquakes, volcanos, glaciers, groundwater, minerals, rocks, deserts, fossils; topographic and geologic maps; climate change on geologic and human time scales. Enroll Info: None
Requisites: Not open to students with credit for GEOSCI 101, 109, or GEOSCI/ENVIR ST 106
Course Designation: Breadth - Physical Sci. Counts toward the Natural Sci req
Level - Elementary
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2019

GEOSCI/ATM OCN/ENVIR ST 102 — CLIMATE AND CLIMATE CHANGE
3 credits.

This course describes the basic climate principles governing the climate system. It describes the climate and climate variability at present, climate evolution in the past, and the projected climate change into the future. The scientific principles underlying the natural and anthropogenic greenhouse effect and climate model forecasts are elucidated. Enroll Info: None
Requisites: None
Course Designation: Breadth - Physical Sci. Counts toward the Natural Sci req
Level - Elementary
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Summer 2019

GEOSCI/ATM OCN 105 — SURVEY OF OCEANOGRAPHY
3-4 credits.

Nature and behavior of ocean water, interaction of oceans and atmosphere, structure of the ocean floor, life in the oceans, our relationship to the marine environment. Enroll Info: High school physics or chem recommended. Open to Freshmen
Requisites: None
Course Designation: Breadth - Physical Sci. Counts toward the Natural Sci req
Level - Elementary
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2019

GEOSCI/ENVIR ST 106 — ENVIRONMENTAL GEOLOGY
3 credits.

Application of geology to problems resulting from the ever more intense use of the earth and its resources. Lecture and discussion. Enroll Info: Not open to those who have had Geosci 101, 100, or 109. Open to Fr
Requisites: None
Course Designation: Breadth - Physical Sci. Counts toward the Natural Sci req
Level - Elementary
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Summer 2019

GEOSCI 107 — LIFE OF THE PAST
3 credits.

Minerals, rocks, geologic time; origin of life; paleobiology, evolution and classification of fossil plants, invertebrates, and vertebrates. Lecture, lab. Field trip optional. Enroll Info: Not open to those who have had GEOSCI 204. Open to Fr
Requisites: None
Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Elementary
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2012

GEOSCI 109 — THREE BILLION YEARS BENEATH YOUR FEET: GEOLOGY OF THE NATIONAL PARKS
3 credits.

Famously called "America's best idea", the National Parks of the US record two-thirds of Earth's history, from the most ancient mountains to active volcanic eruptions. The geologic story of the National Parks is explored in the framework of physiography, tectonics, time, and fundamental geologic processes, highlighting the major parks from Hawaii, to Alaska, to the conterminous US. In aggregate, the course provides the student with a view of the geological evolution of the Earth using specific examples that they are likely to visit in their lifetime. Enroll Info: None
Requisites: None
Course Designation: Breadth - Physical Sci. Counts toward the Natural Sci req
Level - Elementary
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Fall 2018

GEOSCI 110 — EVOLUTION AND EXTINCTION
4 credits.

Contemporary views of the origin and diversification of life; crises in the history of life, with emphasis on controversies regarding mass extinctions, particularly at the close of the Paleozoic and Mesozoic eras. Enroll Info: None
Requisites: None
Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Elementary
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2019

GEOSCI 111 — VOLCANOES AND CIVILIZATION
1 credit.

An introduction to the impact and influence volcanoes have had on the evolution of the Earth, life, human civilizations, and modern society. Enroll Info: None
Requisites: None
Course Designation: Breadth - Physical Sci. Counts toward the Natural Sci req
Level - Elementary
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2018

GEOSCI 112 — MOUNTAINS AND MOVING PLATES
1 credit.

An introduction to the Earth's great mountain ranges, the processes that lead to their births and deaths, and the reasons why continental mountain ranges differ dramatically from oceanic mountains and mountains on other planets. Enroll Info: None
Requisites: None
Course Designation: Breadth - Physical Sci. Counts toward the Natural Sci req
Level - Elementary
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Fall 2016

GEOSCI 115 — SCIENCE BEHIND THE NEWS - THE WORLD AROUND US
1-2 credits.

This internet course will examine the earth and environmental science behind the news with the goal of producing more informed and knowledgeable citizens. The content will vary from semester to semester as topical modules become available. Enroll Info: Open to Fr. Not open to stdts who have completed other 100-level Geoscience crses
Requisites: None
Course Designation: Breadth - Physical Sci. Counts toward the Natural Sci req
Level - Elementary
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2018

GEOSCI 117 — EX-FILES: LIFE IN THE EARTH'S EXTREME ENVIRONMENT
2 credits.

This course will explore the diversity of microbial life forms in modern and ancient geological environments, with a focus on extreme environments of geological origin or relevance. Inquire-based activities will include exploration of unusual aspects of microbial life in everyday settings, as well as preparation and presentation of individual projects. Enroll Info: None
Requisites: None
Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Elementary
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Fall 2018

GEOSCI 118 — EYE IN THE SKY: MONITORING THE EARTH BY SATELLITE
1 credit.

Fundamentals of satellite imagery applied to the earth sciences. Basics of image interpretation. Multitemporal data. Resolution and uncertainty. Existing and emerging technologies. Orbits, wavelengths, and satellites. Socio-economic impact of remotely-sensed data. Enroll Info: None
Requisites: None
Course Designation: Breadth - Physical Sci. Counts toward the Natural Sci req
Level - Elementary
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2019

GEOSCI/ATM OCN 140 — NATURAL HAZARDS AND DISASTERS
3 credits.

An exploration of the science behind natural disasters including earthquakes, tsunamis, volcanic eruptions, landslides, tornadoes, hurricanes, and floods. Why, where, and when do these events occur, and why are some predictable but others are not? The course will also address hazard assessment, forecasting, and mitigation to lessen their impact on society. Enroll Info: None
Requisites: None
Course Designation: Breadth - Physical Sci. Counts toward the Natural Sci req
Level - Elementary
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Fall 2018

GEOSCI/ASTRON 160 — LIFE IN THE UNIVERSE
2 credits.

An examination of the origin and evolution of life in the universe based on our knowledge of astronomy, biology, and geology. Includes discussions on the search for extraterrestrial life and the history of life in our solar system. Enroll Info: None
Requisites: None
Course Designation: Breadth - Physical Sci. Counts toward the Natural Sci req
Level - Elementary
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2019

GEOSCI 198 — DIRECTED STUDY
1-3 credits.

Enroll Info: Graded on a Cr/N basis; requires cons inst
Requisites: Consent of instructor
Course Designation: Level - Elementary
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Spring 2012

GEOSCI 199 — DIRECTED STUDY
1-3 credits.

Enroll Info: None
Requisites: Consent of instructor
Course Designation: Level - Elementary
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Spring 2019

GEOSCI 202 — INTRODUCTION TO GEOLOGIC STRUCTURES
4 credits.

Introduction to recognition and mapping of geologic structures in the field. Landforms, folds, faults, tectonics, geologic maps, and field instrumentation. Enroll Info: GEOSCI 100, 101, 106, 109 or cons inst
Requisites: None
Course Designation: Breadth - Physical Sci. Counts toward the Natural Sci req
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Fall 2018

GEOSCI 204 — GEOLOGIC EVOLUTION OF THE EARTH
4 credits.

Physical evolution of the earth and its relationship to the development of life through geologic time. Lecture, lab, and field trips. Enroll Info: GEOSCI 100, 101, 106, 109 or cons inst
Requisites: None
Course Designation: Breadth - Physical Sci. Counts toward the Natural Sci req
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2019

GEOSCI 304 — GEOBIOLOGY
3 credits.

An integrative approach to studying the interaction between the atmosphere, hydrosphere, biosphere, and geosphere as they have evolved during earth history. Overarching theme includes ocean-climate system changes, biogeochemical cycles, evolution from microbes to mammals, and critical events in life history. Enroll Info: GEOSCI 204 or cons inst
Requisites: None
Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2018

GEOSCI/GEOG 320 — GEOMORPHOLOGY
3 credits.

Principles and analysis of geomorphic processes and resulting land forms. Field trip. Enroll Info: One of the following: GEOSCI 100, 101, 106, 109, 204, GEOG/ENVIR ST 120, 127
Requisites: None
Course Designation: Breadth - Physical Sci. Counts toward the Natural Sci req
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2019

GEOSCI/GEOG 326 — LANDFORMS-TOPICS AND REGIONS
3 credits.

Emphasis on natural and human processes that control the morphology of the land and its waterways. When taught by Knox, major emphasis on surface water hydrology, erosion, sedimentation, and physical characteristics of streams and rivers. Enroll Info: Intro phy geog or phy geosci crse, or cons inst
Requisites: None
Course Designation: Breadth - Physical Sci. Counts toward the Natural Sci req
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Spring 2016

GEOSCI 331 — GEMS: THE SCIENCE BEHIND THE SPARKLE
1-2 credits.

This online course covers many of the important aspects of gemology. It explores the formation, collection, properties, and treatment of many popular gemstones. Enroll Info: Jr st. Stdts who have taken Geosci 306 are not eligible for 331. GEOSCI 331 does not count toward the geol major
Requisites: None
Course Designation: Breadth - Physical Sci. Counts toward the Natural Sci req
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2019

GEOSCI 333 — THE AGE OF DINOSAURS
3 credits.

This course, intended for non-majors, will survey the evolution and paleobiology of important groups of vertebrates that lived during the Mesozoic Era. Animals that will be covered include dinosaurs, crocodilians, pterosaurs, lizards, turtles, and synapsids. Enroll Info: None
Requisites: None
Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Fall 2012

GEOSCI/ATM OCN/ENVIR ST/GEOG 335 — CLIMATIC ENVIRONMENTS OF THE PAST
3 credits.

Climatic change at timescales from the last 1,000,000 years to the last 1000 years. Examines how climate variability arises from interplay between external forcings, feedbacks within the earth system, and (more recently) human activity. Enroll Info: None
Requisites: GEOG/ENVIR ST 120, GEOG/ENVIR ST 127, or ATM OCN 100
Course Designation: Breadth - Physical Sci. Counts toward the Natural Sci req
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Fall 2018

GEOSCI/G L E 350 — INTRODUCTION TO GEOPHYSICS: THE DYNAMIC EARTH
3 credits.

Methods of geophysics applied to earth structure and plate tectonics. Principles of seismology, gravity, geodesy, magnetism and heat flow. Enroll Info: MATH 221
Requisites: None
Course Designation: Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2019

GEOSCI/G L E 360 — PRINCIPLES OF MINERALOGY
3 credits.

Minerals, their physical and chemical properties, crystallography, and geologic significance. Enroll Info: 1 sem college chem or concurrent registration
Requisites: None
Course Designation: Breadth - Physical Sci. Counts toward the Natural Sci req
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2018

GEOSCI/G L E 370 — ELEMENTARY PETROLOGY
3 credits.

Igneous, sedimentary and metamorphic rocks, studied in hand sample and thin section. Enroll Info: GEOSCI/G L E 360
Requisites: None
Course Designation: Breadth - Physical Sci. Counts toward the Natural Sci req
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2019

GEOSCI/ENVIR ST/F&W ECOL/G L E/GEOG/LAND ARC 371 — INTRODUCTION TO ENVIRONMENTAL REMOTE SENSING
3 credits.

Introduction to the Earth as viewed from above, focusing on use of aerial photography and satellite imagery to study the environment. Includes physical processes of electromagnetic radiation, data types and sensing capabilities, methods for interpretation, analysis and mapping, and applications. Enroll Info: MATH 114 Sophomore standing
Requisites: None
Course Designation: Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Summer 2019

GEOSCI/ENVIR ST/F&W ECOL/G L E/GEOG/LAND ARC 372 — INTERMEDIATE ENVIRONMENTAL REMOTE SENSING
3 credits.

Examines intermediate-level concepts in information extraction, data processing and radiative transfer relevant to remote sensing of the environment. Includes transforms, image correction, classification algorithms and change detection, with emphasis on applications for land use planning and natural resource management. Enroll Info: Envir St 301 or consent of instructor, sophomore standing
Requisites: None
Course Designation: Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2015

GEOSCI 375 — PRINCIPLES OF GEOCHEMISTRY
3 credits.

Provides a chemical basis for understanding the origin, evolution, distribution and interactions of chemical elements and isotopes between the lithosphere, hydrosphere, biosphere, and atmosphere in geological and environmental processes. Enroll Info: GEOSCI/G L E 360 and CHEM 109; and GEOSCI/G L E 370 or con reg; or cons inst
Requisites: None
Course Designation: Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2019

GEOSCI 376 — TOPICS IN GEOLOGY
1-3 credits.

Special topics or discussions of recent research. To be given as the need and opportunity arise. Different sections of this course may be simultaneously offered in two or more areas of geology. May be repeated for credit. Enroll Info: None
Requisites: None
Course Designation: Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Spring 2019

GEOSCI/ENVIR ST 410 — MINERALS AS A PUBLIC PROBLEM
3 credits.

Distribution of mineral resources; present and future problems of mineral supply; conservation of minerals, and mineral resources in relation to national and international policy. Enroll Info: None
Requisites: None
Course Designation: Breadth - Natural Science
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2011

GEOSCI/ENVIR ST 411 — ENERGY RESOURCES
3 credits.

Sources, availability of fuels. Energy conversion and efficiency. Consumption patterns and trends. Environmental consequences of energy production and use. Policy considerations and alternatives. Enroll Info: Crse in college level math a crse in phy sci or cons inst
Requisites: None
Course Designation: Breadth - Physical Sci. Counts toward the Natural Sci req
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Summer 2019

GEOSCI/GEOG 420 — GLACIAL AND PLEISTOCENE GEOLOGY
3 credits.

Principles, characteristics and work of glaciers; events of the Pleistocene. Field trip. Enroll Info: GEOSCI 100, 101, 106 or 109 or GEOG/ENVIR ST 120
Requisites: None
Course Designation: Breadth - Physical Sci. Counts toward the Natural Sci req
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2019

GEOSCI 430 — SEDIMENTOLOGY AND STRATIGRAPHY
3 credits.

Comprehensive survey of the processes and products of sedimentation, including depositional environments, sedimentary tectonics, sequence stratigraphic principles, and analytical methods. Enroll Info: Geosci 203 or GEOSCI/G L E 360 370; GEOSCI 204; and GEOSCI 100, 101 or 106
Requisites: None
Course Designation: Breadth - Physical Sci. Counts toward the Natural Sci req
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2019

GEOSCI/G L E 431 — SEDIMENTARY & STRATIGRAPHY LAB
1 credit.

Field- and specimen-based laboratory course in Sedimentology Stratigraphy; emphasizes qualitative and quantitative description and interpretation of sediments and sedimentary deposits. Enroll Info: GEOSCI 204, GEOSCI/G L E 360, GEOSCI/G L E 370
Requisites: None
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2018

GEOSCI/CIV ENGR/ENVIR ST/G L E 444 — PRACTICAL APPLICATIONS OF GPS SURVEYING
2 credits.

Global positioning system surveying for field applications. Signals. Coordinate systems. Datums. Cartographic projections. Satellite orbits. Choosing hardware. Strategies for data collection and analysis. Assessing uncertainty. Geocoding satellite images. Integrating data with Geographic Information Systems. Emerging technologies. Enroll Info: Math 210, 211, 221 or equiv or cons inst
Requisites: None
Course Designation: Breadth - Physical Sci. Counts toward the Natural Sci req
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2019

GEOSCI/G L E 455 — STRUCTURAL GEOLOGY
4 credits.

Principles of rock deformation, structures in layered rocks, structural analysis, intrusive structures. Lab: three-dimensional problems involving structural concepts; field trip. Enroll Info: GEOSCI 202, 204, one term of physics. GEOSCI/G L E 360 and 370 recommended or concurrent registration
Requisites: GEOSCI 202 & 204 & 360
Course Designation: Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2019

GEOSCI 456 — GEOLOGIC FIELD METHODS
2 credits.

Theory and techniques of geologic mapping; field trips. Geology 456 cannot be taken in lieu of Geology 459. Enroll Info: GEOSCI/G L E 455 must be taken con reg
Requisites: None
Course Designation: Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2019

GEOSCI 457 — CONDUCTED FIELD TRIP
2 credits.

A one or two week trip primarily for the study of the principles and methods of geologic mapping. Enroll Info: Cons inst; GEOSCI/G L E 370 or con reg
Requisites: None
Course Designation: Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2019

GEOSCI 459 — FIELD GEOLOGY
6 credits.

Detailed geologic mapping and solution of related problems in the field. A multi institutional course based at Park City, Utah. Enroll Info: Geosci 203 or GEOSCI/G L E 360 370; GEOSCI/G L E 455; cons inst
Requisites: None
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Summer 2019

GEOSCI/G L E/M S & E 474 — ROCK MECHANICS
3 credits.

Classification of rock masses, stress and strain in rock, elastic and time-dependent behavior of rock, state of stress in rock masses, failure mechanisms, lab testing, geological and engineering applications. Enroll Info: EMA 201 or 214, 304, or cons inst
Requisites: None
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2019

GEOSCI/HIST SCI 514 — HISTORY OF GEOLOGIC THOUGHT
3 credits.

Major concepts from earliest to modern times. Enroll Info: Sr st, GEOSCI 100 or 101 204 or cons inst
Requisites: None
Course Designation: Breadth - Humanities
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2016

GEOSCI 515 — PRINCIPLES OF ECONOMIC GEOLOGY
4 credits.

(Open to mining engineering students for 3 cr.) Composition, structure, occurrence, origin, and economic investigation of important groups of mineral deposits; problems of mineral deposition. Enroll Info: Geosci 203 or GEOSCI/G L E 360 370; GEOSCI 204; or cons inst
Requisites: None
Course Designation: Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2018

GEOSCI 517 — MONSTERS AND SCIENCE: A HISTORY OF VERTEBRATE PALEONTOLOGY
3 credits.

This course will explore the history of vertebrate paleontology, concentrating on the 19th through 21st centuries. The shifting and sometimes uncomfortable relations between paleontology and other sciences, the arts and the public will be a major theme of the course. Enroll Info: Junior standing
Requisites: None
Course Designation: Breadth - Humanities
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2013

GEOSCI/GEOG 523 — QUATERNARY VEGETATION DYNAMICS
3 credits.

Geographic responses of plant species and terrestrial ecosystems to late-Quaternary environmental change, particularly changes in climate and carbon dioxide. Quarternary vegetation dynamics are relevant to understanding vegetational responses to the 21st-century climate change. Laboratory section emphasizes multivariate data analysis and vegetational modeling. Enroll Info: Jr st GEOG/ENVIR ST 120/127 or equiv
Requisites: None
Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2013

GEOSCI/GEOG 524 — ADVANCED LANDFORM GEOGRAPHY
3 credits.

Purposes, methods, and content of analysis of landforms, with emphasis on quantitative descriptive regional variation, and functional relationships. Enroll Info: Cons inst or Jr st
Requisites: None
Course Designation: Breadth - Physical Sci. Counts toward the Natural Sci req
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Fall 2011

GEOSCI/GEOG 527 — THE QUATERNARY PERIOD
3 credits.

Principles of Quaternary studies emphasizing terrestrial records and paleoecology of the past two million years and comparisons with the deep ocean record and models of climatic change. Enroll Info: 1 intermed-level course in physical geog or geosci; or consent of instructor
Requisites: None
Course Designation: Breadth - Physical Sci. Counts toward the Natural Sci req
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2012

GEOSCI/G L E 537 — QUANTITATIVE METHODS FOR GEOSCIENCE
3 credits.

MATLAB is a powerful, high-level programming language and integrated development environment (IDE) that is used across a broad variety of scientific disciplines for tasks including data visualization, modeling, and application development. The focus of this course will thus be on the active use of MATLAB for developing practical programming and data analysis skills that can be applied across a range of geoscience- relevant problems. Applications will include: data visualization and publishable figure development; automation of data processing; statistical and time-series analysis; image processing and mapping; and optimization. Additional topics may be guided by student interest. Enroll Info: None
Requisites: MATH 222 or graduate/professional standing
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2018

GEOSCI/ZOOLOGY 541 — PALEOBIOLOGY
3 credits.

The evolutionary process as interpreted from the fossil record. Topics include: the study of form; tempo and mode of evolution; levels and mechanisms of evolutionary change; extinction in the fossil record; trends and patterns in the history of life; macroevolution. Enroll Info: GEOSCI 304 or 540 or course in introductory biology
Requisites: None
Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2016

GEOSCI/ZOOLOGY 542 — INVERTEBRATE PALEONTOLOGY
3 credits.

The evolutionary history, morphology, and ecology of fossil invertebrates. Labs emphasize fossil identification and recognition of basic morphological features. Enroll Info: GEOSCI 107, 110, 204, or a course in introductory biology
Requisites: None
Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2014

GEOSCI 551 — OCEANOGRAPHY: RECENT MARINE SEDIMENTS
3 credits.

Origin, dispersal, composition, and in situ properties of recent clastic and carbonate seafloor deposits. Modern investigations of deep-sea cores, continental shelf and slope deposits, and on interpretation of mutually related oceanographic and sedimentary data. Enroll Info: None
Requisites: None
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2018

GEOSCI 556 — MOUNTAIN BELTS
3 credits.

Examination of interaction of tectonic plates and the resulting structures. Enroll Info: Geoscience 455
Requisites: None
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2018

GEOSCI 557 — STRUCTURAL PETROLOGY
3 credits.

Petrographic investigation of rock fabrics and deformation using thin sections. Use of microscopes and U-stage. Enroll Info: Geosci 203 or GEOSCI/G L E 360 370; GEOSCI/G L E 455; or cons inst
Requisites: None
Course Designation: Breadth - Physical Sci. Counts toward the Natural Sci req
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2017

GEOSCI/G L E 594 — INTRODUCTION TO APPLIED GEOPHYSICS
3 credits.

Survey of applied geophysics, including seismic refraction, seismic reflection, electrical resistivity, gravity, and magnetics methods. The course will cover the basic physics of each method and modeling techniques and field procedures. Enroll Info: 1 yr of college calc, 1 yr of college physics
Requisites: None
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2018

GEOSCI/G L E 595 — FIELD METHODS IN APPLIED AND ENGINEERING GEOPHYSICS
1 credit.

The application of geophysical field methods for delineating near-surface features and/or structures as applied to engineering, environmental and exploration problems. Enroll Info: 1 yr coll calc, 1 yr coll physics or EMA 201, 202 PHYSICS 202, prev or con reg in Geoscience 594
Requisites: None
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2018

GEOSCI 610 — GEOCHRONOLOGY, TIMESCALES, AND RATES OF GEOLOGIC PROCESSES
3 credits.

Application of radioisotopic (Ar-Ar, U-Pb, U-Th, U-He) and cosmogenic (He, Ne, Cl, Be, C) dating methods. Status of geologic, astronomic and paleomagnetic timescales, Chronology of flood basalts, impacts, extinctions, glaciations. Constraints on rates of magmatism, mountain uplift, deformation, erosion, sedimentation. Enroll Info: Geosci 203 or GEOSCI/G L E 360 370 or equiv, or cons inst
Requisites: None
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2017

GEOSCI/G L E 627 — HYDROGEOLOGY
3-4 credits.

Mathematical treatment of the physical principles governing the flow of groundwater; emphasis on well hydraulics and flow system analysis; problem sets and class projects. Enroll Info: Intro course in geol, Jr st MATH 221 or equiv
Requisites: None
Course Designation: Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2018

GEOSCI/G L E 629 — CONTAMINANT HYDROGEOLOGY
3 credits.

Physical and chemical processes governing the transport of solutes in groundwater; application of hydrogeologic and geochemical theory and practice to the protection of aquifers from contamination; problem sets and group projects. Enroll Info: Geoscience 627 and college level chemistry or cons inst
Requisites: None
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2018

GEOSCI 681 — SENIOR HONORS THESIS
3 credits.

Enroll Info: None
Requisites: Consent of instructor
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Honors - Honors Only Courses (H)
Repeatable for Credit: No
Last Taught: Fall 2014

GEOSCI 682 — SENIOR HONORS THESIS
3 credits.

Enroll Info: None
Requisites: Consent of instructor
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Honors - Honors Only Courses (H)
Repeatable for Credit: No
Last Taught: Spring 2015

GEOSCI 691 — SENIOR THESIS
3-4 credits.

The senior thesis involves research conducted in collaboration with a faculty member (non honors students). Enroll Info: Major in geology and geophysics or geological engineering
Requisites: Consent of instructor
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2019

GEOSCI 692 — SENIOR THESIS
3-4 credits.

The senior thesis involves research conducted in collaboration with a faculty member (non honors students). Enroll Info: Major in geology and geophysics or geological engineering
Requisites: Consent of instructor
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2019

GEOSCI 698 — DIRECTED STUDY
1-6 credits.

Enroll Info: Jr or Sr st. Graded on a Cr/N basis; requires cons inst
Requisites: Consent of instructor
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Fall 2018

GEOSCI 699 — DIRECTED STUDY
1-6 credits.

Enroll Info: Jr or Sr st. Graded on a lettered basis; requires cons inst
Requisites: Consent of instructor
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Summer 2019

GEOSCI 720 — GLACIOLOGY
3 credits.

Addresses the fundamentals of glaciology and glacier landform mechanics: mass balance, ice deformation, basal slip, temperature structure, glacial hydrology, sediment deformation and deposition, and landform building processes. Emphasizes an understanding of the mathematical principles that dictate how glaciers function. Begins with a classical treatment of the mechanics of glaciers and moves onto fundamental advances in the field of glaciology over the past 60 years. The glaciology component of class will be approximately 70% of total material covered, the remaining 30% of the course will address the topic of glacial landform building. Enroll Info: None
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No

GEOSCI/G L E 724 — GROUNDWATER FLOW MODELING
3 credits.

An introduction to the principles of modeling groundwater flow systems, with emphasis on regional flow system analysis. Conceptual understanding of governing equations, and the use of finite difference techniques to solve such equations are stressed. Students develop their own codes and are introduced to packaged models, including those developed by the U. S. Geological Survey. Enroll Info: GEOSCI/G L E 627 or equivalent, calculus
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2016

GEOSCI 727 — ADVANCED HYDROGEOLOGY
1-3 credits.

Advanced topics in Hydrogeology. Enroll Info: GEOSCI/G L E 627 and cons inst
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Spring 2016

GEOSCI 729 — FIELD APPLICATIONS IN HYDROGEOLOGY
2 credits.

Instruction and practice in instrumentation and techniques used in collection and interpretation of data. Lectures, labs, and field work in and around Madison. Enroll Info: GEOSCI/G L E 627
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Summer 2015

GEOSCI 731 — CARBONATE GEOLOGY
2 credits.

Comprehensive survey of the processes and products of carbonate sedimentation. Enrolling students should have completed all or most of the geology course requirements for an undergraduate major, in particularly sedimentary geology and stratigraphy. Enroll Info: None
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2019

GEOSCI 732 — GEOCHEMISTRY OF SEDIMENTS
3 credits.

Processes involved in the origin of chemical sediments; shales, carbonates, and evaporites. Enroll Info: GEOSCI/G L E 360, 370
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2017

GEOSCI 737 — CONDUCTED FIELD TRIP
2 credits.

A 10-day field trip to South Florida carbonate province or to the Ouachita-Arbuckle area, or to other areas pertinent to sedimentary geology. Lectures precede trip. Enroll Info: A stratigraphy or sedimentology crse or cons inst
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Spring 2011

GEOSCI 740 — MICROPALEONTOLOGY I
3 credits.

Microscopic fossils; conodonts, foraminifera, and ostracodes in particular; their biology, ecology, evolution, and stratigraphic distribution. Enroll Info: GEOSCI/ZOOLOGY 541
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2014

GEOSCI/G L E 747 — TECTONOPHYSICS
3 credits.

Elasticity and flexure of the earth's lithosphere, heat conduction, mantle convection, earthquake mechanisms, rock rheology, and fluid migration in the earth's crust; integration of geophysical observations, laboratory experiments, and theoretical models. Enroll Info: None
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2018

GEOSCI/ATM OCN/ENVIR ST/ZOOLOGY 750 — PROBLEMS IN OCEANOGRAPHY
3 credits.

Introduction to techniques used in the study of the biology, chemistry, geology, and physics of the marine environment. Enroll Info: None
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2018

GEOSCI 755 — ADVANCED STRUCTURAL GEOLOGY
3 credits.

Structures in layered, intrusive, and metamorphic rocks; structural analysis. Enroll Info: GEOSCI/G L E 455 or equiv
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2015

GEOSCI 758 — MECHANICS OF EARTHQUAKES AND FAULTING
3 credits.

Addresses current topics and controversies on fault mechanics, earthquake physics, and the rock record of seismicity. The course will emphasize critical reading and in-depth discussion of recent publications drawn from a variety of disciplines, including geophysical, geological, and geochemical studies and approaches. Enroll Info: None
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2017

GEOSCI 765 — CRYSTAL CHEMISTRY
3 credits.

Principles of crystal chemistry, emphasizing the structure and behavior of rock forming minerals. Enroll Info: GEOSCI/G L E 360 or equiv or cons inst
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2018

GEOSCI 771 — IGNEOUS PETROLOGY
3 credits.

Classification, characteristics, and petrogenesis of igneous rocks. Representative rock suites studied in lab. Enroll Info: Geosci 660 or cons inst
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2018

GEOSCI 776 — INTERFACIAL BIOGEOCHEMISTRY
3 credits.

Geochemical basis for understanding reactions at interfaces between mineral surfaces, dissolved organic compounds, biomembranes and aqueous solutions. Topics include sorption, heterogeneous nucleation, mineral dissolution kinetics electric double-layer theory, surface-complexation models, surface spectroscopy, interfacial thermodynamics, biomineralization biomimetic materials synthesis, early evolution of life. Enroll Info: None
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2014

GEOSCI 777 — ELECTRON MICROPROBE ANALYSIS
3 credits.

Proper use and functioning of electron probe and SEM, their use in microanalysis (WDS, EDS), range of applications, and limitations; plus lab. Enroll Info: None
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2019

GEOSCI 793 — GEOPHYSICAL INVERSE THEORY
3 credits.

Application of inverse methods to geophysical measurements of the structure of the earth. Enroll Info: None
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2017

GEOSCI 796 — PHYSICS OF THE EARTH II
3 credits.

Theory and observations of earthquakes, seismic waves and plate tectonics. Enroll Info: PHYSICS 322, MATH 322
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2016

GEOSCI 875 — ADVANCED TOPICS IN GEOLOGY
1-3 credits.

Enroll Info: None
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Spring 2019

GEOSCI/ATM OCN/BOTANY/CIV ENGR/ENVIR ST/ZOOLOGY 911 — LIMNOLOGY AND MARINE SCIENCE SEMINAR
1 credit.

Sections in various fields of zoological research. Enroll Info: Grad st in limnology marine sci grad prgm or cons inst
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Spring 2019

GEOSCI 920 — SEMINAR IN GLACIAL AND PLEISTOCENE GEOLOGY
1-3 credits.

Subjects selected; field trips. Enroll Info: GEOSCI/GEOG 320 420 or cons inst
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Fall 2018

GEOSCI 929 — SEMINAR-HYDROGEOLOGY
1-2 credits.

Subject selected. Enroll Info: GEOSCI/G L E 627 cons inst
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Fall 2015

GEOSCI 940 — SEMINAR IN PALEONTOLOGY
1 credit.

Enroll Info: Geosci 540-541
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Spring 2015

GEOSCI 955 — SEMINAR-STRUCTURAL GEOLOGY
2 credits.

Enroll Info: GEOSCI/G L E 455 or equiv or cons inst
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Fall 2011

GEOSCI 970 — SEMINAR-GEOCHEMISTRY
2 credits.

Enroll Info: None
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Fall 2015

GEOSCI/ATM OCN/BOTANY/ENVIR ST/F&W ECOL/GEOG/ZOOLOGY 980 — EARTH SYSTEM SCIENCE SEMINAR
1 credit.

Topics in earth system science. Emphasis on the coupling between atmospheric, oceanic and land surface systems, involving physical geochemical and biological processes, and including interactions with human systems. Enroll Info: None
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Fall 2016

GEOSCI 990 — RESEARCH
1-12 credits.

Enroll Info: None
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Summer 2019

GEOSCI 991 — SEMINAR: GEOPHYSICS
1-3 credits.

Enroll Info: None
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Fall 2017

GEOSCI 999 — ADVANCED INDEPENDENT READING
1-3 credits.

Enroll Info: None
Requisites: Consent of instructor
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Fall 2017