

# GEOLOGY (GEOL)

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## GEOL 100 Introduction to Geology

**Notes:** Credit toward the degree may be earned in only one of GEOL 100 or GEOL 101 or GEOL 101H

**Description:** Background in physical geology for non-majors. Topics include rocks and minerals, surficial processes, plate tectonics, and applied geology.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Format:** LEC

**ACE:** ACE 4 Science

## GEOL 101 Dynamic Earth

**Notes:** Credit toward the degree may be earned in only one of GEOL 100 or GEOL 101 or GEOL 101H.

**Description:** Minerals, rocks, and ores; the surface features and internal character of the earth and the forces that are constantly changing it. Examination of minerals and rocks and investigation of geological processes and their products.

**Credit Hours:** 4

**Max credits per semester:** 4

**Max credits per degree:** 4

**Format:** LEC

**Prerequisite for:** AGRO 455, AGRO 855, NRES 455, NRES 855, SOIL 455; CNST 241; GEOG 308, GEOL 308, NRES 308; GEOL 103; GEOL 103H; GEOL 200; GEOL 210; GEOL 260; GEOL 372; METR 270

**ACE:** ACE 4 Science

## GEOL 101H Honors: Physical Geology

**Prerequisites:** Good standing in the University Honors Program or by invitation; GEOL major.

**Notes:** Credit toward the degree may be earned in only one of: GEOL 100 or 101 or 101H.

**Description:** Processes that formed the earth and continue to alter it today, from interior forces driving plate tectonics, earthquakes, volcanoes, and mountain building, to surface processes driving the atmosphere, oceans, rivers, glaciers, and landscape formation. Natural resources and their origin.

**Credit Hours:** 4

**Max credits per semester:** 4

**Max credits per degree:** 4

**Format:** LEC

**Prerequisite for:** CNST 241; GEOG 308, GEOL 308, NRES 308; GEOL 103; GEOL 103H; GEOL 200; GEOL 210; GEOL 260; METR 270

## GEOL 103 Evolution of the Earth

**Prerequisites:** GEOL 101

**Description:** Physical and biological evolution of the earth. Lab work includes examination of ancient geological terrains through maps and fossils.

**Credit Hours:** 4

**Max credits per semester:** 4

**Max credits per degree:** 4

**Format:** LEC

**ACE:** ACE 4 Science

## GEOL 103H Honors: Historical Geology

**Prerequisites:** Good standing in the University Honors program or by invitation; GEOL 101.

**Description:** Physical and biological evolution of the earth. Lab work includes examination of ancient geological terrains through maps and fossils.

**Credit Hours:** 4

**Max credits per semester:** 4

**Max credits per degree:** 4

**Format:** LEC

## GEOL 105 Fossils and the History of Life

**Description:** Introduction to the history of life based on the fossil record, evolutionary patterns, and processes.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Format:** LEC

**Offered:** FALL/SPR

**ACE:** ACE 4 Science

## GEOL 106 Environmental Geology

**Description:** Survey of geologic materials and processes with emphasis on those that influence modern societies' adjustment to our environment.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Format:** LEC

**Prerequisite for:** GEOL 372

## GEOL 107 Frontiers of Earth Science

**Description:** Series of three five-week sessions, each dealing with a geologic topic of current interest and concern. Topics vary from term to term and are listed in the Schedule of Classes.

**Credit Hours:** 1-6

**Min credits per semester:** 1

**Max credits per semester:** 6

**Max credits per degree:** 6

**Format:** LEC

## GEOL 109 Oceanography

**Description:** Introduction to physical oceanography, the geologic aspects of biologic oceanography, and human impact on the oceans.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Format:** LEC

**ACE:** ACE 4 Science

## GEOL 110 Deadly Planet

**Description:** Major geological natural hazards that affect human society and the geological processes that are responsible for them, such as earthquakes, tsunamis, volcanoes, landslides, floods, and meteorite impacts.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Format:** LEC

**ACE:** ACE 4 Science

**GEOL 115 The Earth's Energy Resources**

**Description:** The geological controls on the occurrence and distribution of important and potentially important energy resources. The environment and economic implications of energy resources exploration, development, and production.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Format:** LEC

**GEOL 117 Life in the Universe**

**Crosslisted with:** ASTR 117, BIOS 117

**Description:** Survey of what modern science tells us about the possibilities of life elsewhere in the universe. Topics include how the Earth formed and became suitable for life, how life arose on the Earth, the conditions under which life can thrive, places in the solar system that might support life, the existence of other solar systems that might provide suitable habitats, and attempts to find evidence of life on other planets.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Format:** LEC

**ACE:** ACE 4 Science

**GEOL 120 Geology of National Parks and Monuments**

**Description:** Physical and historical geology of selected United States parklands. Geological and geophysical processes that produced the unique features of the parks. Interpretation of fossils, archaeology and geologic history. Environmental park policy issues involving geosciences.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Format:** LEC

**GEOL 125 Frontiers in Antarctic Geosciences**

**Description:** Scientific exploration of the modern environment and geological and climate history of the Antarctic continent and Southern Ocean.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Format:** LEC

**ACE:** ACE 9 Global/Diversity ACE 4 Science

**GEOL 130 The Solar System**

**Description:** Geological survey of the Earth's solar system and evolution of planetary systems.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Format:** LEC

**GEOL 197 Geoscience Fundamentals in the Field**

**Notes:** GEOL 197 requires a field trip

**Description:** Scientific principles and practices illustrated through geological field work in Nebraska and Wyoming.

**Credit Hours:** 1-4

**Min credits per semester:** 1

**Max credits per semester:** 4

**Max credits per degree:** 4

**Format:** FLD

**GEOL 200 Mineralogy**

**Prerequisites:** GEOL 101

**Description:** Crystallography and mineral optics, mineral classes, crystal chemistry, and mineral identification methods. Includes microscope techniques and field methods.

**Credit Hours:** 2

**Max credits per semester:** 2

**Max credits per degree:** 2

**Format:** LEC

**Prerequisite for:** GEOL 201

**GEOL 201 Igneous and Metamorphic Petrology**

**Prerequisites:** GEOL 200

**Description:** Introduction to the petrology of common igneous and metamorphic rocks and their identification, occurrence, and formation. Includes microscope techniques, analytical methods, and phase diagrams.

**Credit Hours:** 2

**Max credits per semester:** 2

**Max credits per degree:** 2

**Format:** LEC

**Prerequisite for:** GEOL 310; GEOL 400; GEOL 410

**GEOL 210 Earth Materials: Rocks and Minerals**

**Prerequisites:** CHEM 109 or 113, or parallel; GEOL 101

**Description:** Crystallography and mineral optics, mineral classes, crystal chemistry, and mineral identification methods. Introduction to the petrology of common igneous and metamorphic rocks and their identification, occurrence, and formation. Includes microscope techniques, field methods, and phase diagrams.

**Credit Hours:** 4

**Max credits per semester:** 4

**Max credits per degree:** 4

**Format:** LEC

**Prerequisite for:** GEOL 211

**GEOL 211 Sedimentology and Stratigraphy**

**Prerequisites:** GEOL 210 or equivalent.

**Description:** Sedimentary rocks and processes, their descriptive parameters, occurrence, origin, and significance in earth history. Stratified rocks in time and space, and methods of correlating geologic units from different localities.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Format:** LEC

**Prerequisite for:** GEOL 310; GEOL 400

**GEOL 260 Geology of the Western USA**

**Prerequisites:** GEOL 101

**Description:** Learn to identify rock types and sedimentary and structural features in the field in the Western United States. Build crucial field skills including the ability to tell a geologic story from a landscape or outcrop.

**Credit Hours:** 1

**Max credits per semester:** 1

**Max credits per degree:** 1

**Format:** FLD

**Offered:** SPRING

**GEOL 299 Independent Study in Geology****Prerequisites:** Permission.**Credit Hours:** 1-3**Min credits per semester:** 1**Max credits per semester:** 3**Max credits per degree:** 3**Format:** IND**GEOL 308 Biogeography****Crosslisted with:** GEOG 308, NRES 308**Prerequisites:** GEOG 155 or BIOS 101 and 101L or GEOL 101.**Notes:** Biogeography is a highly interdisciplinary science, relying heavily on ecology, geological science, and climatology. It is global in scope and offers the latest knowledge in understanding organism distributions, and the factors that determine those distributions.**Description:** Introduction to the basic concepts of biogeography, the study of distributions of plants and animals, both past and present.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**Groups:** Physical Geography**GEOL 310 Depositional Environments****Prerequisites:** GEOL 201 and GEOL 211**Description:** Sedimentological facies analysis and recognition of clastic, carbonate, and evaporite depositional systems in the rock record.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**Prerequisite for:** GEOL 460**GEOL 344 Introduction to Geophysics****Prerequisites:** PHYS 142 or PHYS 212**Description:** Geophysical techniques to study the Earth: seismology, gravity, magnetics and heat flow.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**GEOL 361 Soils, Environment and Water Quality****Crosslisted with:** AGRO 361, NRES 361, SOIL 361, WATS 361**Prerequisites:** AGRO/HORT/SOIL 153; MATH 102 or 103; two semesters chemistry (CHEM 105, 106 or CHEM 109,110) and WATS/GEOG/NRES 281**Description:** Chemical and physical processes that influence the fate and transport of contaminants (inorganic, organic, microbial) in soil-water environments. Extent, fate, mitigation and impact of various sources of pollution. Remedial technologies used for environmental restoration of contaminated environments.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**Prerequisite for:** AGRO 458, AGRO 858, NRES 458, NRES 858, SOIL 458**GEOL 372 Water & Earth Connections****Prerequisites:** GEOL 101, or GEOL 106, or METR 100, and MATH 106, or instructor permission**Description:** Quantitative understanding of water-related processes in the earth sciences.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**GEOL 400 Structural Geology****Prerequisites:** GEOL 201 and 211; MATH 102 or equivalent; PHYS 141 or 141H or 211 or 211H, or parallel.**Description:** Folding and faulting of rocks, types of texture and rock structure, cleavage, joints, dikes, and unconformities; structural interpretation of geologic maps; plate tectonics, mountain belts, and regional structures.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**Offered:** FALL**Prerequisite for:** GEOL 460**ACE:** ACE 10 Integrated Product**GEOL 410 Geochemistry****Prerequisites:** MATH 106; CHEM 109 or 113; GEOL 201.**Description:** Age of the Earth. Origin of the elements, solar system, oceans, atmosphere, and global geochemical cycles. Radioactive isotope geochemistry, stable isotope geochemistry, and equilibrium relationships.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**GEOL 412 Volcanology and Igneous Petrology****Crosslisted with:** GEOL 812**Prerequisites:** GEOL 201; and either CHEM 109 or CHEM 113**Description:** The study of igneous systems, including an investigation of volcanic processes, mineral equilibria, petrography, and the geochemistry of magmas and minerals.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**GEOL 417 Organic Geochemistry****Crosslisted with:** GEOL 817**Prerequisites:** GEOL 410 and CHEM 251.**Description:** Origin, preservation and transport of organic compounds found in the rock record. Applications of organic geochemistry to paleoclimatic and paleoenvironmental interpretations as well as discerning the origins of coal, oil and natural gas.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC

**GEOL 418 Chemistry of Natural Waters**

**Crosslisted with:** GEOL 818, NRES 419, NRES 819, WATS 418

**Prerequisites:** CHEM 109 and 110, 113 and 114, or CHEM 111.

**Description:** Principles of water chemistry and their use in precipitation, surface water, and groundwater studies. Groundwater applications used to determine the time and source of groundwater recharge, estimate groundwater residence time, identify aquifer mineralogy, examine the degree of mixing between waters of various sources and evaluate what types of biological and chemical processes have occurred during the water's journey through the aquifer system.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Format:** LEC

**Prerequisite for:** GEOL 418L, GEOL 818L, NRES 419L, NRES 819L, WATS 418L; GEOL 917, NRES 917

**GEOL 418L Chemistry of Natural Waters Laboratory**

**Crosslisted with:** GEOL 818L, NRES 419L, NRES 819L, WATS 418L

**Prerequisites:** CHEM 109 and 110 or CHEM 113 and 114; GEOL 418 or parallel.

**Description:** Basic laboratory techniques used to perform water analysis including various wet chemical techniques, instrument use (AA, IC, UV-Visible) and computer modeling. Techniques for sample collection and preservation, parameter estimation and chemical analysis.

**Credit Hours:** 1

**Max credits per semester:** 1

**Max credits per degree:** 1

**Format:** LAB

**GEOL 419 Applications of Remote Sensing in Agriculture and Natural Resources**

**Crosslisted with:** AGRO 419, GEOG 419, NRES 420, AGRO 819, GEOG 819, GEOL 819, NRES 820

**Notes:** GEOG 418/NRES 418 recommended

**Description:** Introduction to the practical uses of remote electromagnetic sensing in dealing with agricultural and water-resources issues.

**Credit Hours:** 4

**Max credits per semester:** 4

**Max credits per degree:** 4

**Format:** LEC

**Groups:** Techniques

**GEOL 421 Carbonate Petrology**

**Crosslisted with:** GEOL 821

**Prerequisites:** GEOL 310.

**Notes:** Lab focuses on field, petrographic and geochemical methods.

**Description:** Depositional settings and processes, petrography, geochemistry, diagenesis and geological significance of modern and ancient carbonate rocks and sediments.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Format:** LEC

**GEOL 423 Quaternary Paleoclimatology and Paleoecology**

**Crosslisted with:** BIOS 423, BIOS 823, GEOL 823

**Prerequisites:** 12 hrs GEOL or BIOS.

**Description:** Analysis and interpretation of the Quaternary period's paleoecological data. Patterns of long-term climate variation. Distribution patterns and responses of organisms and ecosystems to Quaternary environmental change.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Format:** LEC

**GEOL 424 Biogeochemical Cycles**

**Crosslisted with:** BIOS 424, BIOS 824, GEOL 824

**Prerequisites:** CHEM 109 or 113; 12 hrs GEOL or BIOS.

**Description:** Chemical cycling at or near the earth's surface, emphasizing interactions among the atmosphere, biosphere, geosphere and hydrosphere. Modern processes, the geological record, and human impacts on elemental cycles.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Format:** LEC

**GEOL 430 Quantitative Methods in Paleontology**

**Crosslisted with:** GEOL 830

**Prerequisites:** GEOL 310.

**Description:** Numerical and statistical analysis of paleontological data including biometry, syn-ecology, and quantitative biostratigraphy.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Format:** LEC

**GEOL 431 Micro-paleontology**

**Crosslisted with:** GEOL 831

**Prerequisites:** GEOL 310.

**Description:** Morphology, classification, ecology and geological application of common fossil and extant marine, brackish, and freshwater microfossils.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Format:** LEC

**GEOL 435 Vertebrate Paleontology**

**Crosslisted with:** GEOL 835

**Prerequisites:** Permission or graduate standing.

**Description:** Survey of the evolution of the vertebrates, including the geological and biological factors that influence the pattern of evolution, and laboratory study of fossil materials of the major vertebrate groups.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Format:** LEC

**GEOL 436 Evolution of Cenozoic Mammals****Crosslisted with:** GEOL 836, NRES 436, NRES 836**Prerequisites:** GEOL 103**Description:** Survey of mammalian evolution with emphasis on the origin, radiation, and phylogenetic relationships of Cenozoic fossil mammals. Overview of climatic and ecological changes affecting mammalian adaptations and hands on experience with specimens.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**Prerequisite for:** GEOL 935**GEOL 440 Tectonics****Crosslisted with:** GEOL 840**Prerequisites:** GEOL 400.**Description:** Theory of plate tectonics; tectonic controls on rock assemblages; interpretation of regional structure and tectonic history; origin and tectonic evolution of terrestrial planets.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**GEOL 442 Environmental Geophysics I****Crosslisted with:** GEOL 842**Prerequisites:** MATH 107; PHYS 211; GEOL 101 or 106; or equivalent/permission.**Description:** Introduction to the principles of seismic, ground-penetrating radar, and bore-hole geophysical methods and their application to groundwater, engineering, environmental, and archaeological investigations.**Credit Hours:** 4**Max credits per semester:** 4**Max credits per degree:** 4**Format:** LEC**GEOL 443 Environmental Geophysics II****Crosslisted with:** GEOL 843**Prerequisites:** MATH 107; PHYS 211; GEOL 101 or 106.**Description:** Introduction to principles of magnetic, electromagnetic, resistivity, and gravity methods and their application to ground water, engineering, environmental, and archaeological investigations.**Credit Hours:** 4**Max credits per semester:** 4**Max credits per degree:** 4**Format:** LEC**GEOL 444 Geomicrobiology****Crosslisted with:** BIOS 444, BIOS 844, GEOL 844**Prerequisites:** 3 hours of BIOS or 3 hours of LIFE; 3 hours of CHEM**Description:** Lectures and discussions of primary literature regarding microorganisms and their role transforming Earth through geologic time.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**GEOL 445 Advanced Geophysics****Crosslisted with:** GEOL 845**Prerequisites:** GEOL 344**Description:** Integrative analysis of geophysical data (gravity, magnetics, seismic) with geological information (well logs, tectonic history, etc.)**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**GEOL 446 Exploration Geophysics****Crosslisted with:** GEOL 846**Prerequisites:** GEOL485/885**Description:** Geophysical methods used for petroleum exploration: potential fields, seismology, electrical and electromagnetic surveying.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**GEOL 450 Surficial Processes and Landscape Evolution****Crosslisted with:** GEOL 850**Prerequisites:** GEOL 310.**Description:** Fluvial, glacial, eolian, and coastal processes and landforms. Roles of tectonics, climate, and climate change in landscape evolution. Lab stresses description and interpretation of landforms from remotely-sensed, cartographic, and field data.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**Prerequisite for:** GEOL 465, GEOL 865, NRES 465, NRES 865**GEOL 451 Invertebrate Paleobiology****Crosslisted with:** BIOS 451, BIOS 851, GEOL 851**Prerequisites:** At least one of: GEOL 103, GEOL 105, LIFE 121**Description:** Overview of the key traits, relationships and evolutionary dynamics of invertebrate animals over Earth's history, particularly over the Phanerozoic (i.e., the last 540 million years). Emphasis on the use of invertebrate fossil record to test ideas about long term evolutionary patterns as well as learning the histories and basic anatomies of major invertebrate taxa.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**Offered:** SPRING**GEOL 457 Ecosystem Ecology****Crosslisted with:** BIOS 457, BIOS 857, GEOL 857**Prerequisites:** BIOS 207 and CHEM 110 and Senior standing**Description:** Processes controlling the cycling of energy and elements in ecosystems and how both plant and animal species influence them. Human-influenced global and local changes that alter these cycles and ecosystem functioning.**Credit Hours:** 4**Max credits per semester:** 4**Max credits per degree:** 4**Format:** LEC**Prerequisite for:** BSEN 954, NRES 954**ACE:** ACE 10 Integrated Product

**GEOL 460 Summer Field Course****Prerequisites:** GEOL 310 and GEOL 400.**Notes:** Students must sign up with the department during the Fall semester prior to the camp.**Description:** Six weeks advanced study of selected field problems. Conducted in a geologically classic area where all major rock types are studied in a variety of geologic situations.**Credit Hours:** 6**Max credits per semester:** 6**Max credits per degree:** 6**Format:** FLD**ACE:** ACE 10 Integrated Product**GEOL 461 Soil Physics****Crosslisted with:** AGRO 461, NRES 461, SOIL 461, WATS 461, AGRO 861, GEOL 861, NRES 861**Prerequisites:** AGRO/SOIL 153; PHYS 141 or equivalent, one semester of calculus.**Description:** Principles of soil physics. Movement of water, air, heat, and solutes in soils. Water retention and movement, including infiltration and field water regime. Movement of chemicals in soils.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**Prerequisite for:** AGEN 955, AGRO 955, CIVE 955, GEOL 985**GEOL 465 Soil Geomorphology and Paleopedology****Crosslisted with:** GEOL 865, NRES 465, NRES 865**Prerequisites:** GEOL 450/850 and NRES 477/877.**Description:** Soils and paleosols as evidence in reconstruction landscape evolution and paleoenvironments. Role of paleosols in stratigraphy.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**GEOL 470 Field Techniques in Hydrogeology****Crosslisted with:** GEOL 870**Prerequisites:** GEOL 488/888.**Description:** Basic techniques, field procedures, instruments, and software for data interpretation, and characterization of groundwater flow and contaminant transport.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**GEOL 472 Water in Geosciences****Crosslisted with:** GEOL 872**Prerequisites:** MATH 106 and 107; PHYS 141; and one of the following: GEOL 101 or 106 or METR 100.**Description:** Quantitative approach to water in geological media, earth surface and atmosphere. Understanding and analysis of physical processes involved in groundwater-surface-atmosphere interactions.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**GEOL 475 Water Quality Strategy****Crosslisted with:** NRES 475, NRES 875, SOCI 475, SOCI 875, SOIL 475, WATS 475, AGRO 475, AGRO 875, CIVE 475, CIVE 875, CRPL 475, CRPL 875, GEOL 875, MSYM 475, MSYM 875, POLS 475, POLS 875**Prerequisites:** Senior standing.**Notes:** Capstone course.**Description:** Holistic approach to the selection and analysis of planning strategies for protecting water quality from nonpoint sources of contamination. Introduction to the use of methods of analyzing the impact of strategies on whole systems and subsystems; for selecting strategies; and for evaluating present strategies.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**ACE:** ACE 10 Integrated Product**Groups:** American Government&Public Pol**GEOL 480 Economic Geology of the Metals****Crosslisted with:** GEOL 880**Prerequisites:** GEOL 400; CHEM 114, 221.**Description:** Occurrence and utilization of the metallic ores. Elementary theory of ore genesis.**Credit Hours:** 2**Max credits per semester:** 2**Max credits per degree:** 2**Format:** LEC**GEOL 484 Water Resources Seminar****Crosslisted with:** AGRO 484, GEOG 484, NRES 484, WATS 484, NRES 884, AGRO 884, GEOG 884, GEOL 884, WATS 884**Prerequisites:** Junior or above standing**Description:** Seminar on current water resources research and issues in Nebraska and the region.**Credit Hours:** 1**Max credits per semester:** 1**Max credits per degree:** 1**Format:** LEC**GEOL 485 Fossil Fuel Geology and Exploration****Crosslisted with:** GEOL 885**Prerequisites:** GEOL 310.**Description:** Geology of coal, oil and gas, and methods of exploration.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**Prerequisite for:** GEOL 446, GEOL 846**GEOL 488 Groundwater Geology****Crosslisted with:** GEOL 888, NRES 488, NRES 888**Prerequisites:** GEOL 100-level course; MATH 106 or equivalent.**Description:** Occurrence, movement, and development of water in the geologic environment.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**Prerequisite for:** AGEN 955, AGRO 955, CIVE 955, GEOL 985; GEOL 470, GEOL 870; GEOL 889, NRES 887; GEOL 986; NRES 918

**GEOL 495 Economic and Exploration Geology**

**Crosslisted with:** GEOL 895

**Prerequisites:** GEOL 310.

**Notes:** A required parallel course will be indicated by the instructor. Field trips which are required and supported by alumni endowment may be scheduled during semester breaks. Course content will vary on a 3-year rotational basis. Combined lectures, seminars, weekend short courses, and field trips.

**Description:** E.F. Schramm Course in Economic Geology. Aspects of fossil fuel geology and exploration.

**Credit Hours:** 2

**Max credits per semester:** 2

**Max credits per degree:** 2

**Format:** LEC

**GEOL 498 Special Topics in Geology**

**Prerequisites:** Permission.

**Notes:** Full titles will appear on students' transcripts.

**Description:** Reviews of specialized subject areas.

**Credit Hours:** 1-24

**Min credits per semester:** 1

**Max credits per semester:** 24

**Max credits per degree:** 24

**Format:** LEC

**GEOL 499 Independent Study in Geology**

**Prerequisites:** Permission.

**Credit Hours:** 1-24

**Min credits per semester:** 1

**Max credits per semester:** 24

**Max credits per degree:** 24

**Format:** IND

**GEOL 499H Honors Course**

**Prerequisites:** Permission.

**Credit Hours:** 1-4

**Min credits per semester:** 1

**Max credits per semester:** 4

**Max credits per degree:** 4

**Format:** LEC