GEOLOGY (GEOL)

GEOL 100 Introduction to Geology
Notes: 100 does not fulfill the prerequisite requirement for any course in geology. 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: Lab includes field trips. 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; GEOL 200; GEOL 210; GEOL 372
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. One afternoon field trip and one overnight field trip required.
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; GEOL 200; GEOL 210

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 Dinosaurs and the History of Life
Prerequisites: GEOL major.
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 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
ACE: ACE 4 Science

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
ACE: ACE 4 Science

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
ACE: ACE 4 Science

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 4 Science ACE 9 Global/Diversity

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 160 Geoscience Fundamentals in the Field
Description: Scientific principles and practices illustrated through geological field work in Nebraska and Wyoming for science educators.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Format: FLDE

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

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

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

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

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 (GEOG/GEOL/NRES 308) 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 210 and 211, or equivalent.  
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

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 210.  
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 210; 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: 2 semesters of college chemistry, or CHEM 109 and 110, 113 and 114, or CHEM 111; or permission.  
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
GEOL 418L Chemistry of Natural Waters Laboratory
Crosslisted with: GEOL 818L, NRES 419L, NRES 819L, WATS 418L
Prerequisites: Two semesters college chemistry or permission.
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, NRES 820
Prerequisites: GEOG/NRES 418.
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

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, diagénésis 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 436, BIOS 836, GEOL 823
Prerequisites: 12 hrs GEOL or BIOS.
Description: Analysis and interpretation of the Quaternary period’s paleoclimatological 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 438, BIOS 838, GEOL 824
Prerequisites: CHEM 109 or 113; 12 hrs geology or biological sciences.
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

GEOL 440 Tectonics
Crosslisted with: GEOL 840
Prerequisites: GEOL 400 or permission
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 or 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; or equivalent or permission.  
Description: Introduction to principles of magnetic, electromagnetic, resistivity, and gravity 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 444 Geomicrobiology  
Crosslisted with: BIOS 444, BIOS 844, GEOL 844  
Prerequisites: 3 hours biological sciences and 3 hours chemistry.  
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 450 Surficial Processes and Landscape Evolution  
Crosslisted with: GEOL 850  
Prerequisites: GEOL 310 or permission.  
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

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

ACE: ACE 10 Integrated Product

GEOL 460 Summer Field Course  
Prerequisites: GEOL310 and GEOL340  
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.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Format: LEC

GEOL 465 Soil Geomorphology and Paleopedology  
Crosslisted with: GEOL 865, NRES 465, NRES 865  
Prerequisites: GEOL 450/850 and NRES 477/877; or permission.  
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 or permission
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: 12 hrs geology including GEOL 210, 400; CHEM 114, 116.
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, or permission
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: 12 hrs geology.
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

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

GEOL 495 Economic and Exploration Geology
Crosslisted with: GEOL 895
Prerequisites: GEOL 310 and GEOL 320; or equivalent. Recommended parallel: A GEOL course as indicated by the instructor and will vary according to the course content of GEOL 495.
Notes: Field trips are required and supported by alumni endowment. Course content will vary on a 3-year rotational basis. Combined lectures, seminars, weekend short courses, and field trips. Field trips are required and supported by alumni endowment. Field trips may be scheduled during semester breaks.
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. The nature of a given semester's course will depend on student demand and availability of staff.
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: Prior agreement with and permission of individual faculty member.
Credit Hours: 1-24
Min credits per semester: 1
Max credits per semester: 24
Max credits per degree: 24
Format: LEC

GEOL 499H Honors Course
Prerequisites: Open to candidates for degrees with distinction, with high distinction, and with highest distinction in the College of Arts and Sciences.
Credit Hours: 1-4
Min credits per semester: 1
Max credits per semester: 4
Max credits per degree: 4
Format: IND