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, GEOG 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, GEOG 308, NRES 308; GEOL 103; GEOL 103H; GEOL 200; GEOL 210; GEOL 260; GEOL 372; 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: 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

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

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 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

ACE: ACE 9 Global/Diversity ACE 4 Science

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:** 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**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, diageneis 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: GEOL 485
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 evolutionay 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 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 467 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

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