**GEOLOGY**

The Geology Program in the Department of Geography/Geology at UNO is dedicated to educating students in the Geological Sciences. This program prepares students for a variety of careers, but in particular, working in the geosciences field. This would include working in the growing environmental, energy, and minerals industries, in the policy and education areas, as well as being prepared to continue on to graduate school.

**Other Information**

All coursework taken for a Geology major or minor must be completed with a grade of “C-” or better.

**Student Groups**

University of Nebraska-Omaha Geoscience Society (UNOGS)

**Contact**

DSC 260
402-554-2662

**Website** [http://www.unomaha.edu/college-of-arts-and-sciences/geology](http://www.unomaha.edu/college-of-arts-and-sciences/geology)

**Writing in the Discipline**

All students are required to take a writing in the discipline course within their major. For the geology major, this is GEOL 4950 or other approved course.

**Degrees Offered**

- Geology, Bachelor of Arts [http://catalog.unomaha.edu/undergraduate/college-arts-sciences/geology/geology-ba](http://catalog.unomaha.edu/undergraduate/college-arts-sciences/geology/geology-ba)
- Geology, Bachelor of Science [http://catalog.unomaha.edu/undergraduate/college-arts-sciences/geology/geology-bs](http://catalog.unomaha.edu/undergraduate/college-arts-sciences/geology/geology-bs)

**Minors Offered**

- Geology Minor [http://catalog.unomaha.edu/undergraduate/college-arts-sciences/geology/geology-minor](http://catalog.unomaha.edu/undergraduate/college-arts-sciences/geology/geology-minor)

**GEOL 1170 INTRODUCTION TO PHYSICAL GEOLOGY (4 credits)**

Fundamentals of geology. The study of the internal geologic processes and external and erosional and depositional processes which create the subsurface and surface features of the earth. Fundamentals of contour mapping, topographic map interpretation and identification of common minerals and rocks will be covered in a required laboratory period. One field trip required.

**Distribution:** Natural/Physical Sci General Education lecture&lab

**GEOL 1180 INTRODUCTION TO HISTORICAL GEOLOGY (4 credits)**

Basic fundamentals for interpretation of earth history. Deduction of history of earth-moon system through interpretation of geologic phenomena using principles of stratigraphy, sedimentation, structure and fossil content. Global tectonics, encompassing theories of sea-floor spreading and continental drift are presented. Fundamentals and interpretation of geologic environments and geologic maps, coupled with identification of fossils will be covered in a required laboratory period. One Saturday field trip required.

**Prerequisite(s)/Corequisite(s):** GEOL 1170 or GEOL 1070 or permission of Geography-Geology Department.

**GEOL 2014 ENVIRONMENTAL GEOLOGY LAB (1 credit)**

Basic topics such as geohydrology, water quality, waste management (including landfill siting and design), flood frequency, slope stability and earthquake hazards are covered via labs and field trips at a detailed introductory level. Local sites and associated data are used where possible to illustrate fundamental principles and commonly used analytic techniques.

**Prerequisite(s)/Corequisite(s):** GEOL 1010 or GEOG 1170 or GEOG 1030 or permission of instructor.

**GEOL 2100 GEOLOGY OF NEBRASKA (3 credits)**

An introduction to the geologic features of Nebraska, and how the evidence they provide can be used to scientifically interpret the ancient history of the region. A review of the geologic history of Nebraska as it is currently understood will place the events documented in the larger context of Earth history.

**Distribution:** Natural/Physical Science General Education course

**GEOL 2300 GEOSCIENCE DATA ANALYSIS AND MODELING (3 credits)**

Introduction to foundation geoscience analysis and modeling techniques. Topics covered include: describing and comparing populations, simple data manipulations, fractals, surface contouring and modeling, exponential behavior, GIS, graphic representation, and computer modeling. Abundant examples and exercises will work with actual geoscience data.

**Prerequisite(s)/Corequisite(s):** GEOL 1010 or GEOL 1170, or GEOG 1030 or GEOG 1060 or GEOG 1070, or permission of instructor.

**GEOL 2500 SPECIAL TOPICS IN GEOGRAPHY-GEOLOGY (1 credit)**

This course will provide for an in-depth study of a geographical or geological subject (as specified in the course subtitle). Various classes will be offered as sections of GEOL 2500, but will be separate from one another. Students may repeat GEOL 2500 as often as they like as long as no specific subject is duplicated.

**Distribution:** Natural/Physical Science General Education course

**GEOL 2600 GEOhYDROLOGY (3 credits)**

A course dealing with geology, chemistry and hydraulic of groundwater. Designed mainly for Geology majors but can be helpful to other disciplines where ground water is involved.

**Prerequisite(s)/Corequisite(s):** MATH 1930 or MATH 1950

**GEOL 2750 MINERALOGY (3 credits)**

Introduction to crystallography and mineralogy. Crystallography section is a study of crystal structure, symmetry and crystal systems. Mineralogy section is devoted to the description, identification and classification of minerals based on their crystal forms, physical properties, chemical composition and occurrence in nature. Must be taken concurrently with GEOL 2754.

**Prerequisite(s)/Corequisite(s):** GEOL 1170. Must be taken concurrently with GEOL 2754.
GEOL 2754 MINERALOGY LABORATORY (1 credit)
A systematic investigation of minerals and the techniques of studying minerals to be taken concurrently with GEOL 2750. (Fall)
Prerequisite(s)/Corequisite(s): Concurrent enrollment in GEOL 2750

GEOL 2760 IGNEOUS AND METAMORPHIC PETROLOGY (3 credits)
A study of the nature of igneous and metamorphic rocks. Topics include genesis and crystalization of magmas, phase equilibria of mineral assemblages, and pressure and temperature conditions of metamorphism. One weekend field trip will be required. Must be taken concurrently with GEOL 2764.
Prerequisite(s)/Corequisite(s): GEOL 2750. Must be taken concurrently with GEOL 2764.

GEOL 2764 IGNEOUS AND METAMORPHIC PETROLOGY LABORATORY (1 credit)
Petrology Laboratory is an introduction to the methods of petrology with emphasis on hand specimen identification and use of the petrographic microscope. Must be taken concurrently with GEOL 2760. (Spring)
Prerequisite(s)/Corequisite(s): Concurrent enrollment in GEOL 2760

GEOL 3100 INVERTEBRATE PALEONTOLOGY (3 credits)
An introduction to the development of life through the study of the morphology, evolution and geological distribution of fossils. Must be taken concurrently with GEOL 3104. (Cross-listed with BIOL 3100).
Prerequisite(s)/Corequisite(s): GEOL 1180. Must be taken concurrently with GEOL 3104.

GEOL 3104 INVERTEBRATE PALEONTOLOGY LABORATORY (1 credit)
An examination of representative specimens of groups of organisms important in the fossil record and an introduction to analytical techniques in paleontology. Must be taken concurrently with GEOL 3100.
Prerequisite(s)/Corequisite(s): GEOL 1180 or permission; Concurrent enrollment in GEOL 3100

GEOL 3300 STRUCTURAL GEOLOGY (3 credits)
A study of the deformation of rocks in the earth's crust. Analysis of stress and strain in rocks under physical conditions occurring in the earth's crust. Recognition and interpretation of structural features. Must be taken concurrently with GEOL 3310.
Prerequisite(s)/Corequisite(s): GEOL 2760, MATH 1930 or MATH 1950. Must be taken concurrently with GEOL 3310.

GEOL 3310 STRUCTURAL GEOLOGY FIELD METHODS (1 credit)
A course to accompany GEOL 3300. Field trips are included. Emphasis will be on collection and presentation of field data. Must be taken concurrently with GEOL 3300.
Prerequisite(s)/Corequisite(s): GEOL 2760, MATH 1930 or MATH 1950. Concurrent enrollment in GEOL 3300.

GEOL 3400 INTRODUCTION TO SEDIMENTARY GEOLOGY (3 credits)
An introduction to the basic principles and concepts of sedimentology and stratigraphy. It will include a review of sedimentary processes and depositional environments and principles and techniques of stratigraphy, such as biostratigraphy and radiometric dating.
Prerequisite(s)/Corequisite(s): GEOL 2760 and GEOL 2764

GEOL 3700 PLATE TECTONICS (3 credits)
An introduction to and analysis of the all-embracing concept that has revolutionized the Earth Sciences, the theory of plate tectonics; paleomagnetic data, polar wandering and magnetic reversals; structure and life cycle of the oceanic crust, origin of the major structural features of the earth, ice-age form distribution, island arcs, crustal rejuvenation, continental collisions, mineral deposits.
Prerequisite(s)/Corequisite(s): GEOL 1170, GEOL 1180 and upper division standing.

GEOL 4040 GEOARCHAEOLOGY (3 credits)
The study of archaeology with the use of geological and geographical methodology. (Cross-listed with GEOG 4040, GEOG 8046).
Prerequisite(s)/Corequisite(s): Major in geology or geography; or major in anthropology, philosophy, or religion with GEOL 1030, GEOG 1060 or GEOG 1070; or GEOL 1170 or GEOG 1010; or permission.

GEOL 4100 BIOGEOGRAPHY (3 credits)
This course is intended as an introduction to biogeography, the study of the distribution of organisms in space and time. Usually offered every year. (Cross-listed with GEOL 8106, BIOL 4100, BIOL 8106, GEOG 4100, GEOG 8106).
Prerequisite(s)/Corequisite(s): BIOL 1450 and BIOL 1750 or GEOL 3100 or BIOL 3100, junior-senior.

GEOL 4250 LANDFORM STUDIES: THEORY AND STRUCTURAL GEOMORPHOLOGY (3 credits)
Primarily a lecture course with emphasis on the historical development of theories in evolution of earth surface features and processes, coupled with underlying structural controls of landforms.
Prerequisite(s)/Corequisite(s): GEOG 1070 or GEOL 1170.

GEOL 4260 PROCESS GEOMORPHOLOGY (3 credits)
Primarily a lecture and laboratory course. Emphasis on methodology and modern process-oriented geomorphology. (Cross-listed with GEOG 8266).
Prerequisite(s)/Corequisite(s): GEOG 1070 or GEOL 1170.

GEOL 4330 SOIL GENESIS, MORPHOLOGY AND CLASSIFICATION (4 credits)
This course is designed to familiarize students with basic soil chemical, physical and biological properties, soil morphological characteristics, soil classification and soil forming processes. The course focuses on relationships between soils and environmental factors and how such factors alter soil forming processes. The lab will focus on developing basic field skills, including soil morphological descriptions and soil mapping, as well as common laboratory methods used to analyze soils. (Cross-listed with GEOG 4330, GEOG 8336)
Prerequisite(s)/Corequisite(s): GEOG 1030, GEOG 1050, GEOG 1010, GEOL 1170 or instructor permission.

GEOL 4400 GEOPHYSICS (3 credits)
A study of geophysical techniques used to understand the earth and in resource exploration. Seismic, gravity, heat flow, magnetic and other methods will be presented. The insights from these methods into earthquake events, stress distributions, rock rheology and plate tectonics will also be addressed. Interpretive skills will be emphasized.
Prerequisite(s)/Corequisite(s): GEOL 1710, PHYS 2110, MATH 1930 or MATH 1950 or permission of instructor

GEOL 4540 GEOCHEMISTRY (3 credits)
This course will cover the application of chemical principles to geologic systems. Specific topics covered will include the origin of elements and their distribution in the earth, geochemistry, stable isotope systems, aqueous geochemistry and crystal chemistry. These topics will be integrated to the study of igneous, metamorphic and sedimentary rocks and ore deposits. (Every third semester).
Prerequisite(s)/Corequisite(s): GEOL 1170, CHEM 1190 and either GEOL 2750 or CHEM 2500

GEOL 4600 INDEPENDENT RESEARCH (1-3 credits)
Advanced study in the form of a major paper to give the senior student knowledge of and experience in using government documents, professional and primary materials concerned with a region. Must be under the supervision of the instructor who is particularly qualified for the topic chosen. (Cross-listed with GEOG 4600).
Prerequisite(s)/Corequisite(s): Permission of department chair.
GEOL 4610 ENVIRONMENTAL MONITORING AND ASSESSMENT (3 credits)
An interdisciplinary approach to techniques for the design and implementation of environmental inventory and monitoring schemes used to evaluate natural resources. Students work as teams to synthesize information from their backgrounds in geography, geology and ecology to evaluate the impacts of human actions on environmental quality following the framework for environmental assessments provided by the National Environmental Policy Act. Course is organized to accommodate variable needs of students with different backgrounds and career choices. Usually offered every year. (Cross-listed with BIOL 4610, ENVN 4610, GEOG 4610, GEOG 8616, GEOL 8616).
Prerequisite(s)/Corequisite(s): Permission of instructor.

GEOL 4620 ADVANCED FIELD COURSE (6 credits)
Six weeks of advanced study on selected field problems. Conducted in a geologically classic area where all the major rock types and structures may be studied in a variety of geological situations. Reports, which integrate the geology, surface processes and literature of the studied areas, is required. Recommended to follow the junior year.
Prerequisite(s)/Corequisite(s): GEOL 1170, GEOL 1180, GEOL 2750, GEOL 2760, GEOL 3300: GEOL 3450 recommended.

GEOL 4640 CRITICAL ZONE SCIENCE (4 credits)
This course examines the Critical Zone (CZ), Earth’s permeable layer that extends from the top of vegetation to the bottom of groundwater. The CZ is a constantly evolving layer where rock, soil, water, air, and living organisms interact to regulate the landscape and natural habitats; it also determines the availability of life-sustaining resources, including our food production and water quality. CZ science is an interdisciplinary and international endeavor focused on cross-disciplinary science. In this course, we will focus on using data available from the existing National Science Foundation (NSF)-funded CZ Observatories (CZOIs) along with readings, discussions and activities to explore interactions within the CZ. (Cross-listed with GEOG 4640, GEOG 8646)
Prerequisite(s)/Corequisite(s): GEOL 1170, GEOL 1180, GEOG 1030 or GEOG 1050; one chemistry or physics course recommended; or instructor permission.

GEOL 4800 INTERNSHIP IN ENVIRONMENTAL/REGIONAL PLANNING/Earth SCIENCE (1-6 credits)
Internship with local agencies or corporations enabling students to gain knowledge and experience in comprehensive regional or environmental planning or environmental science.
Prerequisite(s)/Corequisite(s): Senior, major or area of concentration in geography or environmental science and permission.

GEOL 4950 SENIOR THESIS (3 credits)
An independent research project undertaken by all geology majors during their final year. Topics will be selected in consultation with appropriate faculty and researched through field work, laboratory work and/or library sources.
Prerequisite(s)/Corequisite(s): Senior