

GEOLOGY

Description

The Department of Earth and Atmospheric Sciences offers both the bachelor of science and the bachelor of arts degrees in geology. The bachelor of science program is designed for those who expect to continue in graduate work and become professional geoscientists. Undergraduate training in geology is also beneficial in many other fields such as teaching at the precollege level, urban planning, law, civil engineering, environmental studies, and museum work. Students preparing for these or similar areas are advised to take the bachelor of arts program, which is strong in fundamental geology but does not emphasize the ancillary courses required for admission to many graduate programs.

Field Trips. Many of the geology courses require field trips that typically include camping and primitive conditions. The number of trips and their duration are a function of the requirements of the particular course. Students seeking information or accommodation should contact the course instructor.

Program Assessment. In order to assist the department in evaluating the effectiveness of its programs, majors will be required to maintain and submit a portfolio of material produced for the required Summer Field Course, GEOL 460 (for BS students), or for the required Depositional Environments course, GEOL 310 (for BA students). Course instructors will inform students of the required contents, deadlines and procedures. Results of participation in this assessment activity will in no way affect a student's GPA or graduation.

Admission

College Admission

The entrance requirements for the College of Arts and Sciences are the same as the UNL General Admission Requirements. Students who are admitted through the Admission by Review process may have certain conditions attached to their enrollment at UNL. These conditions are explained under "Removal of Deficiencies."

In addition to these requirements, the College of Arts and Sciences strongly recommends a third and fourth year of one foreign language in high school. Four years of high school coursework in the same language will fulfill the College of Arts and Sciences' language requirement. It will also allow students to continue language study at a more advanced level at UNL, and provide more opportunity to study abroad.

Advising

Academic and Career Advising

The Academic and Career Advising Center in 107 Oldfather is a centrally located and easily accessed resource for students in all majors in the College of Arts and Sciences. The professional academic advisors and career coaches offer 1-1 meetings on a walk-in and appointment basis weekdays. Advisors will provide assistance choosing majors and minors, understanding degree requirements and academic policies, completing paperwork, meeting deadlines, adding/dropping courses, and planning for graduation. In addition, career coaches can help students identify career options related to their interests and connect them with experiences like internships, research, and more that will prepare them for those career options. These specially trained advisors and coaches also serve as first

point of contact in the College for all incoming freshmen and transfer students during New Student Enrollment.

Students in the College who have declared a major will be assigned an academic advisor who is their first point of contact for a variety of questions. Academic advisors help students be successful in adjusting to UNL overall as well as making progress toward degree completion. The assigned advisor may be located within the department of their primary major, or in the Advising Center. Students can identify their assigned advisor in MyRED on the academics tab. In addition, faculty advisors are experts in their discipline, including advanced coursework and requirements, opportunities for research, student organizations, and considering graduate school in the discipline. Students who have declared a pre-health or pre-law area of interest will also work with advisors in the Exploratory and Pre-Professional Advising Center (Explore Center) in 127 Love Library South, who are specially trained to guide students preparing to enter a professional school.

For complete and current information on advisors for majors, minors, or pre-professional areas, contact the Arts and Sciences Academic and Career Advising Center, 107 Oldfather Hall, 402-472-4190, <http://cas.unl.edu/advising>.

College Degree Requirements

College Distribution Requirements

Bachelor of Arts or Bachelor of Science (16 hours + Language)

The College of Arts and Sciences distribution requirements are designed to ensure a breadth of courses within the liberal arts degree. By engaging in study in several different areas within the College, students develop the ability to learn in a variety of ways and apply their knowledge from a variety of perspectives. All requirements are in addition to University ACE requirements.

- A student may not use a single course to satisfy both an ACE outcome and a College distribution requirement.
- A student may not use a single course to satisfy more than one College Distribution Requirement.
- A student may not use a course from their primary major to satisfy the Breadth Requirement (F), but may apply an ancillary requirement of the primary major or a course from their second major toward this requirement.
- Independent study, directed readings, or internship courses cannot be used to satisfy a College Distribution Requirement.
- Cross-listed courses from interdisciplinary programs will be applied in the same area as courses from the home/cross-listed department.

College Distribution Requirements

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|---|---|
| <i>CDR A - Written Communication</i> | 3 |
| Select from courses approved for ACE outcome 1. | |
| <i>CDR B and BL - Natural, Physical, and Mathematical Sciences with Lab</i> | 4 |
| Select from biochemistry, biological sciences, chemistry, computer science, geology, meteorology, mathematics, physics and statistics. Must include one lab in the natural or physical sciences. Lab courses may be selected from biochemistry, biological sciences, chemistry, geology, meteorology and physics. | |
| Some courses from geography and anthropology may also be used to satisfy the lab requirement above. ¹ | |

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| <i>CDR C - Humanities</i> | 3 |
| Select from classics, English, history, modern languages and literatures, philosophy, and religious studies. ² | |
| <i>CDR D - Social Science</i> | 3 |
| Select from anthropology, communication studies, geography, political science, psychology, or sociology. ³ | |
| <i>CDR E - Language</i> | 0-16 |
| Fulfilled by the completion of the 6-credit-hour second-year sequence in a single foreign language in one of the following departments: Classics and religious studies, or modern languages and literatures. Instruction is currently available in Arabic, Chinese, Czech, French, German, Greek, Japanese, Latin, Russian, and Spanish. | |
| A student who has completed the fourth-year level of one foreign language in high school is exempt from the languages requirement, but encouraged to continue on in their language study. | |
| <i>CDR F - Additional Breadth</i> | 3 |
| Select from natural, physical and mathematical sciences (Area B), humanities (Area C), or social sciences (Area D). Cannot be a course from the primary major. | |
| Credit Hours Subtotal: | 16-32 |

¹ See Degree Audit or a College of Arts and Sciences advisor for approved geography and anthropology courses that apply as natural science.

² Language courses numbered 210 and below do not fulfill the CDR C.

³ See Degree Audit or College of Arts and Sciences advisor for list of natural/physical science courses in anthropology, geography, and psychology that do not apply as social science.

Scientific Base

Bachelor of Science Only (60 hours)

The bachelor of science degree requires students to complete 60 hours in mathematical, physical and natural sciences. Approved courses for scientific base credit come from the following College of Arts and Sciences disciplines: actuarial science, anthropology (selected courses), astronomy, biochemistry (excluding BIOC 101), biological sciences (excluding BIOS 100 or BIOS 203), chemistry (excluding CHEM 101), computer science (excluding CSCE 10), geography (selected courses), geology, life sciences, mathematics (excluding courses below MATH 104), meteorology, microbiology, physics and statistics.

See your degree audit or a College of Arts and Sciences advisor for a complete list including individual classes that fall outside of the disciplines listed above. Up to 12 hours of scientific and technical courses offered by other colleges may be accepted toward this requirement with approval of a college advisor.

Language Requirement

UNL and the College of Arts and Sciences place great value on academic exposure and proficiency in a second language. The UNL entrance requirement of two years of the same foreign language or the College's language distribution requirement (CDR E) will rarely be waived and only with relevant documentation. See the main College of Arts and Sciences page for more details.

Minimum Hours Required for Graduation

A minimum of 120 semester hours of credit is required for graduation from the College of Arts and Sciences. A total grade point average of at least 2.0 is required.

Grade Rules

Restrictions on C- and D Grades

The College will accept no more than 15 semester hours of C- and D grades from other domestic institutions except for UNO and UNK. All courses taken at UNO and UNK impact the UNL transcript. No transfer of C- and D grades can be applied toward requirements in a major or a minor. No UNL C- and D grades can be applied toward requirements in a major or a minor. International coursework (including education abroad) with a final grade equivalent to a C- or lower will not be validated by College of Arts and Sciences departments to be degree applicable.

Pass/No Pass Privilege

The College of Arts and Sciences adheres to the University regulations for the Pass/No Pass (P/N) privilege with the following additional regulations:

- Pass/No Pass hours can count toward fulfillment of University ACE requirements and college distribution requirements up to the 24-hour maximum.
- Most arts and sciences departments and programs do not allow courses graded Pass/No Pass to apply to the major or minor. Students should refer to the department's or program's section of the catalog for clarification. By college rule, departments can allow up to 6 hours of Pass/No Pass in the major or minor.
- Departments may specify that certain courses of theirs can be taken only on a P/N basis.
- The college will permit no more than a total of 24 semester hours of P/N grades to be applied toward degree requirements. This total includes all Pass grades earned at UNL and other U.S. schools. **NOTE:** This 24-hour limit is more restrictive than the University regulation.

Grading Appeals

A student who feels that he/she has been unfairly graded must ordinarily take the following sequential steps in a timely manner, usually by initiating the appeal in the semester following the awarding of the grade:

1. Talk with the instructor concerned. Most problems are resolved at this point.
2. Talk to the instructor's department chairperson.
3. Take the case to the Grading Appeal Committee of the department concerned. The Committee should be contacted through the department chairperson.
4. Take the case to the College Grading Appeals Committee by contacting the Dean's Office, 1223 Oldfather Hall.

Course Level Requirements

Courses Numbered at the 300 or 400 Level

Thirty (30) of the 120 semester hours of credit must be in courses numbered at the 300 or 400 level. Of those 30 hours, 15 hours (1/2) must be completed in residence at UNL.

Residency Requirement

Students must complete at least 30 of the 120 total hours for their degree at UNL. Students must complete at least 1/2 of their major coursework including 6 hours at the 300 or 400 level in their major, and 15 of the 30

hours required at the 300 or 400 level in residence. Credit earned during education abroad may be used toward the residency requirement only if students register through UNL.

ACE Requirements

Consistent with the mission and values of the University, ACE is based on a shared set of four institutional objectives and ten student learning outcomes. The ACE program was approved by faculty in all eight undergraduate colleges and endorsed by the Faculty Senate, the student government, and the Academic Planning Committee in January 2008 for implementation in the fall 2009. ACE aligns with current national initiatives in general education.

To meet the ACE Program requirement, a student will complete a minimum of 3 credit hours for each of the ten ACE Student Learning Outcomes (a total of 30 ACE credit hours). See the ACE website at: <http://ace.unl.edu> for the most current information and the most recently certified courses.

Catalog to Use

Students must fulfill the requirements stated in the catalog for the academic year in which they are first admitted to and enrolled as a degree-seeking student at UNL. In consultation with advisors, a student may choose to follow a subsequent catalog for any academic year in which they are admitted to and enrolled as a degree-seeking student at UNL in the College of Arts and Sciences. Students must complete all degree requirements from a single catalog year. Beginning in 1990-1991 the catalog which a student follows for degree requirements may not be more than 10 years old at the time of graduation.

Learning Outcomes

Graduates of geology will be able to:

1. Be able to understand basic physical geology, historical geology, stratigraphy, and petrology and their roles in building earth materials.
2. Be able to understand structural geology and geomorphology and their roles in landscape evolution.
3. Be able to make accurate field observations from a variety of landscapes.
4. Be able to present geological data and results as coherent written and oral reports.

Major Requirements Bachelor of Science

The BS is recommended as a minimum program for the pre-professional geologist. All candidates for this degree are required to attend a field camp.

Core Requirements

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|----------|-----------------------------------|---|
| GEOL 101 | Dynamic Earth | 4 |
| GEOL 103 | Evolution of the Earth | 4 |
| GEOL 200 | Mineralogy | 2 |
| GEOL 201 | Igneous and Metamorphic Petrology | 2 |
| GEOL 211 | Sedimentology and Stratigraphy | 3 |
| GEOL 310 | Depositional Environments | 3 |
| GEOL 400 | Structural Geology | 3 |
| GEOL 410 | Geochemistry | 3 |

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|--------------------|---------------------|----|
| GEOL 460 | Summer Field Course | 6 |
| Total Credit Hours | | 30 |

Specific Major Requirements

Additional Geology Courses ^{1 2}

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| Select 12 hours of additional GEOL courses at the 200 level or above, with at least one course at the 400 level. | 12 |
| Credit Hours Subtotal: | 12 |
| Total Credit Hours | 12 |

¹ *METR 100 or METR 370 are also allowed to be used.*

² *Recommended Courses for Specific Interests*

- *Professional Geologist:* GEOL 372, GEOL 450, GEOL 470, GEOL 485, GEOL 488
- *Sedimentology:* GEOL 421, GEOL 450, GEOL 485
- *Paleontology and Earth Systems:* GEOL 417, GEOL 423, GEOL 424, GEOL 430, GEOL 431, GEOL 435
- *Hydrological Sciences:* GEOL 372, GEOL 417, GEOL 450, GEOL 470, GEOL 488

Ancillary Requirements

Mathematics

| | | |
|------------------------|-------------|---|
| MATH 106 | Calculus I | 5 |
| MATH 107 | Calculus II | 4 |
| Credit Hours Subtotal: | | 9 |

Chemistry

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|------------------------|-------------------------|---|
| CHEM 109 | General Chemistry I | 4 |
| or CHEM 113 | Fundamental Chemistry I | |
| Credit Hours Subtotal: | | 4 |

Physics

| | | |
|------------------------|-------------------------------|----|
| PHYS 141 | Elementary General Physics I | 5 |
| PHYS 142 | Elementary General Physics II | 5 |
| Credit Hours Subtotal: | | 10 |

Additional Science Courses

Select an additional 6 hours from the following: 6

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|----------------------|--|--|
| ASTR 204 | Introduction to Astronomy and Astrophysics | |
| BIOS 101 & BIOS 101L | General Biology and General Biology Laboratory | |
| BIOS 206 | General Genetics | |
| LIFE 120 & LIFE 120L | Fundamentals of Biology I and Fundamentals of Biology I laboratory | |
| LIFE 121 & LIFE 121L | Fundamentals of Biology II and Fundamentals of Biology II Laboratory | |
| CHEM 110 | General Chemistry II | |
| or CHEM 114 | Fundamental Chemistry II | |
| CHEM 221 | Elementary Quantitative Analysis | |
| CHEM 251 & CHEM 253 | Organic Chemistry I and Organic Chemistry I Laboratory | |
| or CHEM 261 | Organic Chemistry | |
| & CHEM 263 | and Organic Chemistry Laboratory | |
| CHEM 471 | Physical Chemistry | |
| MATH 208 | Calculus III | |
| MATH 221 | Differential Equations | |
| STAT 218 | Introduction to Statistics | |

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|------------------------|-------------------------------------|----|
| STAT 380 | Statistics and Applications | |
| PHYS 311 | Mechanics | |
| PHYS 343 | Physics of Lasers and Modern Optics | |
| Credit Hours Subtotal: | | 6 |
| Total Credit Hours | | 29 |

Bachelor of Arts

Thirty (30) hours of geology courses plus required chemistry and math.

Core Requirements

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|--------------------|-----------------------------------|----|
| GEOL 101 | Dynamic Earth | 4 |
| GEOL 103 | Evolution of the Earth | 4 |
| GEOL 200 | Mineralogy | 2 |
| GEOL 201 | Igneous and Metamorphic Petrology | 2 |
| GEOL 211 | Sedimentology and Stratigraphy | 3 |
| GEOL 310 | Depositional Environments | 3 |
| GEOL 400 | Structural Geology | 3 |
| Total Credit Hours | | 21 |

Specific Major Requirements

Additional Geology Courses¹

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|--|---|
| Select 9 hours of additional GEOL courses, with no more than 4 hours at the 100 level. | 9 |
| Credit Hours Subtotal: | 9 |
| Total Credit Hours | 9 |

¹ Recommended Courses for Specific Interests

- *Professional Geologist*: GEOL 372, GEOL 450, GEOL 470, GEOL 485, GEOL 488
- *Sedimentology*: GEOL 421, GEOL 450, GEOL 485
- *Paleontology and Earth Systems*: GEOL 417, GEOL 423, GEOL 424, GEOL 430, GEOL 431, GEOL 435
- *Hydrological Sciences*: GEOL 372, GEOL 417, GEOL 450, GEOL 470, GEOL 488

Ancillary Requirements

Chemistry

| | | |
|------------------------|-------------------------|---|
| CHEM 109 | General Chemistry I | 4 |
| or CHEM 113 | Fundamental Chemistry I | |
| Credit Hours Subtotal: | | 4 |

MATHEMATICS

| | | |
|--|----------------------------------|--|
| Select one MATH course from the following or higher: | 2-5 | |
| MATH 102 | Trigonometry | |
| MATH 103 | College Algebra and Trigonometry | |
| Credit Hours Subtotal: | 2-5 | |
| Total Credit Hours | 6-9 | |

ADDITIONAL MAJOR REQUIREMENTS

Grade Rules

C- and D Grades

A grade of C or above is required for all courses in the major and minor.

Pass/No Pass

No course taken Pass/No Pass will be counted toward the major or the minor.

Requirements for Minor Offered by Department

Twenty-two (22) hours of geology courses with no more than 8 hours at the 100 level.

Grade Rules

C- and D Grades

A grade of C or above is required for all courses in the major and minor.

Pass/No Pass

No course taken Pass/No Pass will be counted toward the major or the minor.

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:** 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 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**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**PLEASE NOTE**

This document represents a sample 4-year plan for degree completion with this major. Actual course selection and sequence may vary and should be discussed individually with your college or department academic advisor. Advisors also can help you plan other experiences to enrich your undergraduate education such as internships, education abroad, undergraduate research, learning communities, and service learning and community-based learning.

Geology (B.A.)

Geology (B.S.)

Career Information

The following represents a sample of the internships, jobs and graduate school programs that current students and recent graduates have reported.

Transferable Skills

- Read, understand, and critically review scientific information
- Use quantitative analysis techniques
- Analyze and explain data
- Understand and operate within ethical framework for professional work in the field
- Demonstrate ethical conduct in research activities
- Communicate results of scientific experiments to scientific and non-scientific audiences
- Make predictions using mathematical, statistical, and scientific modeling methods
- Understand and use proper laboratory and technical skills and instruments
- Understand and utilize a variety of research methodologies
- Conduct and present research to large and small groups
- Integrate information and perspectives from multiple disciplines to solve problems
- Design and implement research experiments
- Apply mathematical and scientific skills to solve real-world problems
- Comprehend and critically evaluate complex information
- Define problems and identifying causes

Jobs of Recent Graduates

- Geologist, Marathon Oil Company - Houston TX
- Well Site Geologist, Columbine Logging - Denver CO
- Hydrogeologist, United States Geologic Survey - Northborough MA
- Geotechnician, Whiting Petroleum Corporation - Denver CO
- Researcher, University of Nebraska-Lincoln - Lincoln NE
- Geologist, GSI Engineering - Grand Island NE
- Geologist, GSI Engineering - Grand Island NE
- Mud-logger, Selman and Associates - Midland TX
- Geologist, Fulbright - La Plata BA
- Geologist, NioCorp - NE

Internships

- Geologist, Shell Inc. - Houston TX
- Integrated Water Management Specialist Assistant, Nebraska Department of Natural Resources - Lincoln NE
- Student Intern - Hydrology, United States Geological Survey - Lincoln NE
- Geology Intern, Twin Rivers Testing & Environmental - North Platte NE
- Integrated Water Management Technical Assistant, Nebraska Department of Natural Resources - Lincoln NE
- Integrated Water Management Intern, State of Nebraska Department of Natural Resources - Lincoln NE

Graduate & Professional Schools

- Master's Degree, Geology, University of Nebraska-Lincoln - Lincoln NE
- Master's Degree, Geosciences, University of Nebraska-Lincoln - Lincoln NE
- Master's Degree, Education, University of Nebraska-Lincoln - Lincoln NE
- Master's Degree, Geophysics, California Institute of Technology - Pasadena CA
- Master's Degree, Hydrogeology, University of Nebraska-Lincoln - Lincoln NE
- Master's Degree, Geology, University of Missouri-Columbia - Columbia MO
- Ph.D., Geology, University of Michigan - MI
- Master's Degree, Geology, University of Kansas - Lawrence KS
- Master's Degree, Geophysics, California Institute of Technology - Pasadena CA
- Master's Degree, Geology, University of Arizona - Tucson AZ