

EARTH SCIENCE

Earth Science

College of Social & Behavioral Sciences

Department of Geography

206 Morris Hall • 507-389-2617

Website: [www.http://sbs.mnsu.edu/geography](http://sbs.mnsu.edu/geography)

<http://cset.mnsu.edu/chemgeol/programs/geol>

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Earth Science studies the Earth's interrelated physical systems of atmosphere, biosphere, geosphere, hydrosphere, and outer space. Fundamental to Earth Science are the impacts of people and the interactions of chemical, physical, and biological processes at all spatial scales ranging from submicroscopic to planetary, and over time scales from the immediate to billions of years. Thus, courses in Astronomy, Biology, Chemistry, Geography, Geology, and Physics are required to fulfill degree requirements. Majors may choose to earn the BA or BS in the broadly based program or a more focused Geology "option" (BS only) is available. For secondary teacher licensure see the "Science Teaching" program and major. An Earth Science minor is available.

POLICIES/INFORMATION

Admission to Major is granted by the department. Minimum university admission requirements are:

- a minimum of 32 earned semester credit hours.
- a minimum cumulative GPA of 2.00 ("C").

Contact the department for application procedures.

GPA Policy. A GPA of 2.0 or higher in a major or minor is required for graduation.

Refer to the College regarding required advising for students on academic probation.

P/N Grading Policy. All courses in earth science must be taken for a letter grade.

EARTH SCIENCE BA

Degree completion = 120 credits

Major Common Core

AST	101	Introduction to Astronomy (3)
AST	102	Introduction to the Planets (3)
BIOL	100	Our Natural World (4)
CHEM	201	General Chemistry I (5)
GEOG	101	Introductory Physical Geography (3)
GEOG	217	Weather (3)
GEOG	315	Geomorphology (3)
GEOG	410	Climatic Environments (3)
GEOL	121	Physical Geology (4)
GEOL	122	Earth History (4)
GEOL	201	Elements of Mineralogy (4)
PHYS	211	Principles of Physics I (4)

Major Restricted Electives (choose 6 credits)

AST	125	Observational Astronomy (3)
BIOL	432	Lake Ecology (4)
GEOG	313	Natural Disasters (3)
GEOG	370	Cartographic Techniques (4)
GEOG	373	Introduction to Geographic Information Systems (4)
GEOG	411	Soils Geomorphology (3)
GEOG	412	Advanced Weather (4)
GEOG	414	Biogeography (3)
GEOG	415	Earth Surface Processes (4)
GEOG	416	Fluvial Geomorphology and Hydrology (4)
GEOG	420	Conservation of Natural Resources (3)
GEOG	440	Field Studies (1-4)

GEOG	471	Digital Field Mapping with GPS (4)
GEOG	474	Introduction to Remote Sensing (4)
GEOG	480	Seminar (1-4)
GEOL	320	Sedimentology and Stratigraphy (4)
GEOL	330	Structural Geology (4)
GEOL	350	Environmental Geology (4)
GEOL	370	Geotectonics (2)
GEOL	450	Hydrogeology (3)

Required for Bachelor of Arts (BA) degree ONLY: Language (8 credits)

Minor Required: None.

EARTH SCIENCE BS

Degree completion = 120 credits

Major Common Core

AST	101	Introduction to Astronomy (3)
AST	102	Introduction to the Planets (3)
BIOL	100	Our Natural World (4)
CHEM	201	General Chemistry I (5)
GEOG	101	Introductory Physical Geography (3)
GEOG	217	Weather (4)
GEOG	315	Geomorphology (3)
GEOG	410	Climatic Environments (3)
GEOL	121	Physical Geology (4)
GEOL	122	Earth History (4)
GEOL	201	Elements of Mineralogy (4)
PHYS	211	Principles of Physics I (4)

Major Restricted Electives (choose 6 credits)

AST	125	Observational Astronomy (3)
BIOL	432	Lake Ecology (4)
GEOG	313	Natural Disasters (3)
GEOG	370	Cartographic Techniques (4)
GEOG	373	Introduction to Geographic Information Systems (4)
GEOG	411	Soils Geomorphology (3)
GEOG	412	Advanced Weather (4)
GEOG	414	Biogeography (3)
GEOG	415	Earth Surface Processes (4)
GEOG	416	Fluvial Geomorphology and Hydrology (4)
GEOG	420	Conservation of Natural Resources (3)
GEOG	440	Field Studies (1-4)
GEOG	471	Digital Field Mapping with GPS (4)
GEOG	474	Introduction to Remote Sensing (4)
GEOL	320W	Sedimentology and Stratigraphy (4)
GEOL	330	Structural Geology (4)
GEOL	350	Environmental Geology (4)
GEOL	370	Geotectonics (2)
GEOL	450	Hydrogeology (3)

Minor Required: None.

EARTH SCIENCE BS GEOLOGY OPTION

Geology is the study of the Earth, its materials, and its processes. It concerns itself with solving basic scientific problems and utilizing knowledge of the Earth for the benefit of humankind. Its concerns include but are not limited to soil preservation, water production and quality, hazards mitigation, resource exploration and production, engineering of structures large and small, climate change, and the history of life on Earth and the search for life on other planets.

Major Common Core

CHEM	201	General Chemistry I (5)
GEOL	121	Physical Geology (4)
GEOL	122	Earth History (4)
GEOL	201	Elements of Mineralogy (4)
GEOL	302	Petrology (4)

EARTH SCIENCE CONTINUED

GEOL 320 Sedimentology and Stratigraphy (4)
GEOL 330 Structural Geology (4)
MATH 121 Calculus I (4)
PHYS 211 Principles of Physics I (4)

Major Restricted Electives (choose 6-8 credits)

GEOG 315 Geomorphology (3)
GEOG 373 Introduction to Geographic Information Systems (4)
GEOG 420 Conservation of Natural Resources (3)
GEOG 471 Digital Field Mapping with GPS (4)
GEOG 474 Introduction to Remote Sensing (4)
(choose 4-10 credits)
GEOG 440 Geology Field Camp (4-8)
GEOG 497 Internship (1-10)
GEOL 499 Individual Study (1-5)
(choose 7-8 credits)
GEOL 350 Environmental Geology (4)
GEOL 401 Field Studies (1-3)
GEOL 430 Petroleum and Ore Deposit Geology (3)
GEOL 450 Hydrogeology (3)

Other Graduation Requirements

Successful completion of Research Experience for Undergraduates (REU) can be substituted for GEOL 499 as the capstone experience subject to Department approval.

Minor Required: None.

EARTH SCIENCE BS TEACHING (5-12)

Requirements for the Earth Science, Teaching major can be found in the SCIENCE TEACHING section of this catalog.

GEOARCHEOLOGY CERTIFICATE

This certificate cross-trains students in archeology, geography, and geology to emphasize the necessity of understanding physical processes in places and regions as important vectors in shaping human habitation and resource use over time. The certificate prepares students to be highly competitive in either further education or the job market.

Major Common Core

Archeology Foundation

ANTH 210 Introduction to Archaeology (4)

Major Restricted Electives

Earth Science Foundation (choose 3-4 credits)

GEOG 101 Introductory Physical Geography (3)
GEOL 122 Earth History (4)

Archeology Electives (choose 3 credits)

ANTH 410 Archaeology of Minnesota (3)
ANTH 411 Archaeology of Native North America (3)
ANTH 412 Archaeology of Latin America (3)
ANTH 416 Archeological Methods (3)

Earth Science Electives (choose 6-8 credits)

GEOG 315 Geomorphology (3)
GEOG 411 Soils Geomorphology (3)
GEOG 415 Earth Surface Processes (4)
GEOG 416 Fluvial Geomorphology and Hydrology (4)
GEOL 201 Elements of Mineralogy (4)
GEOL 320W Sedimentology and Stratigraphy (4)

EARTH SCIENCE MINOR

Required General Education for Minor

AST 101 Introduction to Astronomy (3)
BIOL 100 Our Natural World (4)
CHEM 100 Chemistry in Society (4)
GEOG 101 Introductory Physical Geography (3)
PHYS 100 Cultural Physics (3)

Required for Minor

GEOL 121 Physical Geology (4)
GEOL 122 Earth History (4)
GEOG 217 Weather (4)
GEOG 315 Geomorphology (3)

Required Electives for Minor

(choose one from the following)

AST 102 Introduction to the Planets (3)
GEOG 410 Climatic Environments (3)
GEOG 420 Conservation of Natural Resources (3)