

EARTH SCIENCE

Earth Science

College of Social & Behavioral Sciences

Department of Geography

7 Armstrong 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.

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.

POLICIES/INFORMATION

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

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)
PHYS	211	Principles of Physics I (4)

Major Restricted Electives

(Choose 1 Cluster)

Interdisciplinary Emphasis

AST	101	Introduction to Astronomy (3)
AST	102	Introduction to the Planets (3)
BIOL	100	Our Natural World (4)
GEOG	101	Introduction to Physical Geography (3)
GEOG	217	Weather (3)
GEOG	315	Geomorphology (3)
GEOG	410	Climatic Environments (3)

(Choose 6 credits)

AST	125	Observational Astronomy (3)
BIOL	432	Lake Ecology (4)
GEOG	370	Cartographic Techniques (4)
GEOG	373	Introduction to Geographic Information Systems (4)
GEOG	412	Advanced Weather (4)
GEOG	420	Conservation of Natural Resources (3)
GEOG	440	Field Studies (1-4)

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)
<u>Geology Emphasis</u> (Choose 16 credits)		
GEOL	302	Petrology (4)
GEOL	320	Sedimentology and Stratigraphy (4)
GEOL	330	Structural Geology (4)
MATH	121	Calculus I (4)
(Choose 6-8 credits)		
GEOG	315	Geomorphology (3)
GEOG	373	Introduction to Geography 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 7-8 credits)		
GEOL	350	Environmental Geology (4)
GEOL	401	Field Studies (1-3)
GEOL	450	Hydrogeology (3)
(Choose 4-10 credits)		
GEOG	497	Internship (1-10)
GEOL	440	Geology Field Camp (4-8)
GEOL	499	Individual Study (1-5)

Other Graduation Requirements

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

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

Minor Required: None.

EARTH SCIENCE BS

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)
PHYS	211	Principles of Physics I (4)

Major Restricted Electives

(Choose 1 Cluster)

Interdisciplinary Emphasis

AST	101	Introduction to Astronomy (3)
AST	102	Introduction to the Planets (3)
BIOL	100	Our Natural World (4)
GEOG	101	Introduction to Physical Geography (3)
GEOG	217	Weather (3)
GEOG	315	Geomorphology (3)
GEOG	410	Climatic Environments (3)
(Choose 6 credits)		
AST	125	Observational Astronomy (3)
BIOL	432	Lake Ecology (4)
GEOG	370	Cartographic Techniques (4)
GEOG	373	Introduction to Geographic Information Systems (4)
GEOG	412	Advanced Weather (4)
GEOG	420	Conservation of Natural Resources (3)
GEOG	440	Field Studies (1-4)
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)

Geology Emphasis (Choose 16 credits)

EARTH SCIENCE

GEOL 302 Petrology (4)
GEOL 320 Sedimentology and Stratigraphy (4)
GEOL 330 Structural Geology (4)
MATH 121 Calculus I (4)
(Choose 6-8 credits)
GEOG 315 Geomorphology (3)
GEOG 373 Introduction to Geography 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 7-8 credits)
GEOL 350 Environmental Geology (4)
GEOL 401 Field Studies (1-3)
GEOL 450 Hydrogeology (3)
(Choose 4-10 credits)
GEOG 497 Internship (1-10)
GEOL 440 Geology Field Camp (4-8)
GEOL 499 Individual Study (1-5)

Other Graduation Requirements

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

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 mankind. 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.

Required General Education (13 credits)

CHEM 201 General Chemistry I (5)
MATH 121 Calculus I (4)
PHYS 211 General Physics I (4)

Core Courses (23 credits)

GEOL 121 Physical Geology (4)
GEOL 122 Earth History (4)
GEOL 201 Elements of Mineralogy (4)
GEOL 202 Lithology (3)
GEOL 320 Sedimentology and Stratigraphy (4)
GEOL 330 Structural Geology (4)

Required Electives (13) Electives must include at least two (2) Geography and at least two (2) Geology courses

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)
GEOL 350 Environmental Geology (4)
GEOL 401 Field Studies (1-3)
GEOL 450 Hydrogeology (3)

Required Capstone Experience (4). Choose from (with advisor approval):

- Senior Thesis; Credited as GEOL 499, Individual Study (1-6)
- Geology Field Camp (provided through an accredited geology program at another college / university)
- Successful Completion of a Research Experience for Undergraduates (REU)
- Earth Science (Geology) Internship (GEOG 497)

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 bulletin.

EARTH SCIENCE MINOR

Required General Education for Minor (17 credits)

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

Required for Minor (Core, 14 credits)

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

Required Electives for Minor (3 credits)

(Choose one from the following)

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