Twin Cities Campus

Environmental Geosciences BS -ARCHIVED

Department of Earth Sciences

College of Science and Engineering

- Program Type: Baccalaureate
- Requirements for this program are current for Fall 2019
- Required credits to graduate with this degree: 120
- Required credits within the major: 86
- This program requires summer terms.
- Degree: Bachelor of Science

Environmental geoscience is the study of processes within, and interactions between, the atmosphere, the ocean and the land that determine the habitability and sustainability of the planet. In short, it is the branch of geoscience that is concerned with the interactions between humans and the geologic environment. The subject covers natural processes that have been modifying the planet over its entire history, but with a strong focus on understanding the modern system and how it has been affected by human activities. Students earning a Major in Environmental Geoscience will develop key observational and analytical skills that enable them to address fundamental questions about the functioning of geoscience systems, especially in relation to hydrology and water quality, soils, mineral resources, and climate change.

This major is well suited to those interested in pursuing geoscience careers in environmental, geological and hydrogeological consulting, industry, and local, state, and federal government agencies. In addition to acquiring a foundation in the geologic processes that govern water, soil, and natural resource development, students will gain a range of transferable skills, including: written and oral reports; critical analysis and interpretation of data; and group work.

Program Delivery

This program is available:

- via classroom (the majority of instruction is face-to-face)

Admission Requirements

Students must complete 6 courses before admission to the program.

Freshman and transfer students students are usually admitted to pre-major status before admission to this major

Students interested in the Environmental Geosciences as a major may want to consider taking ESCI 1001 or other ESCI 1xxx course.

For information about University of Minnesota admission requirements, visit the Office of Admissions website.

Required prerequisites

Courses Required for Admission to the Program

Calculus I, Calculus II, Physics I, Chemistry I, and Mineralogy

ESCI 2301 - Mineralogy (3.0 cr)

Calculus I

MATH 1371 - CSE Calculus I [MATH] (4.0 cr)
or MATH 1271 - Calculus I [MATH] (4.0 cr)
or MATH 1571H - Honors Calculus I [MATH] (4.0 cr)

Calculus II

MATH 1372 - CSE Calculus II (4.0 cr)
or MATH 1272 - Calculus II (4.0 cr)
or MATH 1572H - Honors Calculus II (4.0 cr)

Chemistry

Chemistry 1061/1065

CHEM 1061 - Chemical Principles I [PHYS] (3.0 cr)
CHEM 1065 - Chemical Principles I Laboratory [PHYS] (1.0 cr)

or **Chemistry Honors**

CHEM 1071H - Honors Chemistry I [PHYS] (3.0 cr)
CHEM 1075H - Honors Chemistry I Laboratory [PHYS] (1.0 cr)

Physics

PHYS 1301W - Introductory Physics for Science and Engineering I [PHYS, WI] (4.0 cr)
or PHYS 1401V - Honors Physics I [PHYS, WI] (4.0 cr)

Information current as of March 28, 2024

General Requirements

All students are required to complete general University and college requirements including writing and liberal education courses. For more information about University-wide requirements, see the liberal education requirements.Required courses for the major or minor in which a student receives a D grade (with or without plus or minus) do not count toward the major or minor (including transfer courses).

Program Requirements

All freshmen in the College of Science and Engineering must complete CSE 1001 First Year Experience.

Courses Required for Environmental Geosciences Major

Statistics

Take 1 or more course(s) from the following:

- STAT 3011 - Introduction to Statistical Analysis [MATH] (4.0 cr)
- STAT 3021 - Introduction to Probability and Statistics (3.0 cr)
- STAT 3022 - Data Analysis (4.0 cr)

Major Courses

ESCI 2201 - Solid Earth Dynamics (4.0 cr)
ESCI 3303W - Geochemical Principles [WI] (4.0 cr)
ESCI 3891 - Field Methods (2.0 cr)
ESCI 3911 - Introductory Field Geology (4.0 cr)
ESCI 4203 - Environmental Geophysics (3.0 cr)
ESCI 4401 - Aqueous Environmental Geochemistry (3.0 cr)
ESCI 4501 - Structural Geology (3.0 cr)
ESCI 4602 - Sedimentology and Stratigraphy (3.0 cr)
ESCI 4701 - Geomorphology (4.0 cr)
ESCI 4702 - General Hydrogeology (4.0 cr)
ESCI 4801 - Geomicrobiology (3.0 cr)
ESCI 5805 - Standards and Practices for Professional Geoscienists (3.0 cr)
GEOG 3561 - Principles of Geographic Information Science (4.0 cr)
SOIL 2125 - Basic Soil Science [PHYS, ENV] (4.0 cr)

Advanced Field Geology

Take 1 or more course(s) from the following:

- ESCI 4911 - Advanced Field Geology (4.0 cr)
- ESCI 4971W - Field Hydrogeology [WI] (4.0 cr)

Major Electives

Major electives contribute to a holistic understanding of environmental geoscience. Please take 12 or more credits from the following course list.

Take 12 or more credit(s) from the following:

Earth Science Related Courses

Take 0 or more course(s) from the following:

- EEB 5601 - Limnology (3.0 cr)
- ESCI 2202 - Earth History (4.0 cr)
- ESCI 2203 - Earth Surface Dynamics (4.0 cr)
- ESCI 2302 - Petrology (3.0 cr)
- ESCI 3002 - Climate Change and Human History [ENV] (3.0 cr)
- ESCI 3004 - Water and Society [ENV] (3.0 cr)
- ESCI 3005 - Earth Resources (3.0 cr)
- ESCI 3006 - Rocks and Stars: Introduction to Planetary Science (3.0 cr)
- ESCI 3093 - Directed Studies in Earth & Environmental Sciences: Junior (1.0 - 4.0 cr)
- ESCI 3202 - Fluid Earth Dynamics (4.0 cr)
- ESCI 3402 - Science and Politics of Global Warming [ENV] (3.0 cr)
- ESCI 3890 - Field Workshop (1.0 cr)
- ESCI 3896 - Internship in Earth and Environmental Sciences (1.0 - 4.0 cr)
- ESCI 4010 - Undergraduate Seminar: Current Topics in Earth & Environmental Sciences (1.0 - 4.0 cr)
- ESCI 4093 - Directed Studies in Earth & Environmental Sciences: Senior (1.0 - 4.0 cr)
- ESCI 4094 - Senior Thesis (2.0 cr)
- ESCI 4102W - Vertebrate Paleontology: Evolutionary History and Fossil Records of Vertebrates [WI] (3.0 cr)
- ESCI 4103W - Fossil Record of Mammals [WI] (3.0 cr)
- ESCI 4204 - Geomagnetism and Paleomagnetism (3.0 cr)
- ESCI 4211 *{Inactive}*(3.0 cr)
- ESCI 4212 - Geodynamics (3.0 cr)
- ESCI 4402 - Biogeochemical Cycles in the Ocean (3.0 cr)
- ESCI 4502 - Tectonic Styles (3.0 cr)

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•ESCI 4703 - Glacial Geology (4.0 cr)
•ESCI 5201 - Time-Series Analysis of Geological Phenomena (3.0 cr)
•ESCI 5203 - Mineral and Rock Physics (3.0 cr)
•ESCI 5204 - Geostatistics and Inverse Theory (3.0 cr)
•ESCI 5302 - Isotope Geology (3.0 cr)
•ESCI 5351 *{Inactive}*(3.0 cr)
•ESCI 5353 - Electron Microprobe Theory and Practice (3.0 cr)
•ESCI 5402 - Science and Politics of Global Warming (3.0 cr)
•ESCI 5502 *{Inactive}*(3.0 cr)
•ESCI 5503 - Advanced Petrology (3.0 cr)
•ESCI 5504W *{Inactive}*[WI] (3.0 cr)
•ESCI 5705 - Limnogeology and Paleoenvironment (3.0 cr)
•ESCI 5980 - Seminar: Current Topics in Earth Sciences (1.0 - 4.0 cr)
•ESPM 3425 - Atmospheric Pollution: From Smog to Climate Change (3.0 cr)
•GEOG 3401W - Geography of Environmental Systems and Global Change [ENV, WI] (3.0 cr)
•GEOG 5426 - Climatic Variations (3.0 cr)
•MATS 5353 *{Inactive}*(3.0 cr)
•PUBH 6191 *{Inactive}*(3.0 cr)

•Civil, Environmental, and Geoengineering

Take 0 or more course(s) from the following:
•CEGE 3501 - Introduction to Environmental Engineering [ENV] (3.0 cr)
•CEGE 4562 - Environmental Remediation Technologies (3.0 cr)
•CEGE 5511 - Urban Hydrology and Water Quality (4.0 cr)
•CEGE 5541 - Environmental Water Chemistry (3.0 cr)

•Data Literacy and Environmental Geoscience

Take 0 or more course(s) from the following:
•CSCI 1113 - Introduction to C/C++ Programming for Scientists and Engineers (4.0 cr)
•ESPM 3211 - Survey, Measurement, and Modeling for Environmental Analysis (3.0 cr)
•IE 3521 - Statistics, Quality, and Reliability (4.0 cr)
•STAT 3021 - Introduction to Probability and Statistics (3.0 cr)
•STAT 3022 - Data Analysis (4.0 cr)
•STAT 3032 - Regression and Correlated Data (4.0 cr)

•Social Sciences and Environmental Geoscience

Take 0 or more course(s) from the following:
•ESPM 3011W - Ethics in Natural Resources [CIV, WI] (3.0 cr)
•ESPM 3261 - Economics and Natural Resources Management [SOCS, ENV] (4.0 cr)
•HSCI 3244 - Nature's History: Science, Humans, and the Environment [HIS, ENV] (3.0 cr)
•HSCI 3401 - Ethics in Science and Technology [HIS, CIV] (3.0 cr)
•PHIL 3301 - Environmental Ethics [ENV] (4.0 cr)
•WRIT 3152W - Writing on Issues of Science and Technology [WI] (3.0 cr)
•WRIT 3315 - Writing on Issues of Land and the Environment [AH, DSJ] (3.0 cr)

•Grand Challenge Courses

Take 0 or more course(s) from the following:
•GCC 3004 *{Inactive}*[ENV] (3.0 cr)
•GCC 5008 - Policy and Science of Global Environmental Change [ENV] (3.0 cr)

Upper Division Writing Intensive within the Major

Students are required to take one upper division writing intensive course within the major. If that requirement has not been satisfied within the core major requirements, students must choose one course from the following list. Some of these courses may also fulfill other major requirements.

Take 0 - 1 course(s) from the following:
•ESCI 3303W - Geochemical Principles [WI] (4.0 cr)
•ESCI 4971W - Field Hydrogeology [WI] (4.0 cr)
•ESCI 4102W - Vertebrate Paleontology: Evolutionary History and Fossil Records of Vertebrates [WI] (3.0 cr)
•ESCI 4103W - Fossil Record of Mammals [WI] (3.0 cr)
•ESCI 5504W *{Inactive}*[WI] (3.0 cr)