



Twin Cities Campus

Earth Sciences B.A.

Department of Earth Sciences

College of Liberal Arts

- Program Type: Baccalaureate
- Requirements for this program are current for Fall 2022
- Required credits to graduate with this degree: 120
- Required credits within the major: 65
- This program requires summer terms.
- Degree: Bachelor of Arts

Earth sciences is the study of the composition, structure, and history of the Earth, as well as the processes that operate on and within it. Emphasis on the crust, oceans, and atmosphere. The BA prepares students for graduate study or professional employment.

Earth scientists are employed in a wide range of fields, including exploration for and development of natural resources, environmental science, urban planning, education, oceanography, and other areas related to natural science. Potential employers include the oil, gas, and minerals industries, environmental consultants, federal and private research institutions, universities, schools, and government agencies. An advanced degree is usually required for a career in research or teaching.

Program Delivery

This program is available:

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

Admission Requirements

A GPA above 2.0 is preferred for the following:

- 2.50 transferring from outside the University

Students interested in Earth Sciences as a major may want to consider taking one of these courses with a lab: ESCI 1001, 1005, 1006, or 1007.

For information about University of Minnesota admission requirements, visit the [Office of Admissions website](#).

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

Students are required to take 4 semester(s) of any second language.

CLA BA degrees require 18 upper-division (3xxx-level or higher) credits outside the major designator. These credits must be taken in designators different from the major designator and cannot include courses that are cross-listed with the major designator. The major designator for the Earth Sciences BA is ESCI.

At least 20 upper-division credits in the major must be taken at the University of Minnesota Twin Cities campus.

Students may complete no more than one degree in the Earth Sciences program: a BA or a BS or a minor.

All incoming CLA first-year (freshmen) must complete the First-Year Experience course sequence.

All incoming CLA first-year (freshmen) students earning a BA, BS, or BIS degree must complete the second-year career management course CLA 3002.

All students must complete a capstone in at least one CLA major. The requirements for double majors completing the capstone in a different CLA major will be clearly stated. Students must also complete all major requirements in both majors to allow the additional capstone to be waived. Student completing an addition degree must complete the capstone in each degree area.



Mathematics

Take exactly 2 course(s) totaling exactly 8 credit(s) from the following:

- [MATH 1271](#) - Calculus I [MATH] (4.0 cr)
or [MATH 1371](#) - CSE Calculus I [MATH] (4.0 cr)
or [MATH 1571H](#) - Honors Calculus I [MATH] (4.0 cr)
- [MATH 1272](#) - Calculus II (4.0 cr)
or [MATH 1372](#) - CSE Calculus II (4.0 cr)
or [MATH 1572H](#) - Honors Calculus II (4.0 cr)

Physics

Take exactly 2 course(s) totaling exactly 8 credit(s) from the following:

- [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)
- [PHYS 1302W](#) - Introductory Physics for Science and Engineering II [PHYS, WI] (4.0 cr)
or [PHYS 1402V](#) - Honors Physics II [PHYS, WI] (4.0 cr)

Chemistry

Take exactly 4 course(s) totaling exactly 8 credit(s) from the following:

Chemical Principles I

- [CHEM 1061](#) - Chemical Principles I [PHYS] (3.0 cr)
- [CHEM 1065](#) - Chemical Principles I Laboratory [PHYS] (1.0 cr)
- or [CHEM 1071H](#) - Honors Chemistry I [PHYS] (3.0 cr)
- [CHEM 1075H](#) - Honors Chemistry I Laboratory [PHYS] (1.0 cr)

Chemical Principles II

- [CHEM 1062](#) - Chemical Principles II [PHYS] (3.0 cr)
- [CHEM 1066](#) - Chemical Principles II Laboratory [PHYS] (1.0 cr)
- or [CHEM 1072H](#) - Honors Chemistry II [PHYS] (3.0 cr)
- [CHEM 1076H](#) - Honors Chemistry II Laboratory [PHYS] (1.0 cr)

Core Courses

Take 7 or more course(s) totaling 25 or more credit(s) from the following:

- [ESCI 2001](#) - Intro to Problems in Earth System Sci -with lab [PHYS, ENV] (4.0 cr)
- [ESCI 2101](#) - Intro to Problems in Earth System Science - lecture only [ENV] (3.0 cr)
- [ESCI 2201](#) - Solid Earth Dynamics (4.0 cr)
- [ESCI 2202](#) - Earth History (4.0 cr)
- [ESCI 2203](#) - Earth Surface Dynamics (4.0 cr)
- [ESCI 2301](#) - Mineralogy (3.0 cr)
- [ESCI 3202](#) - Fluid Earth Dynamics (4.0 cr)
- [ESCI 3303W](#) - Geochemical Principles [WI] (4.0 cr)
- [ESCI 3891](#) - Field Methods (2.0 cr)

Introductory Field Geology

Take exactly 1 course(s) totaling exactly 4 credit(s) from the following:

- [ESCI 3911](#) - Introductory Field Geology (4.0 cr)

Electives

ESCI 2302, 4501, and 4602 are strongly recommended for satisfying the elective credits.

Take 8 or more credit(s) from the following:

- [ESCI 2302](#) - Petrology (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 3403](#) - Computer Applications in Earth & Environmental Sciences (3.0 cr)
- [ESCI 3890](#) - Field Workshop (1.0 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 4104](#) - Evolution and Paleobiology of Fossil Reptiles (3.0 cr)
- [ESCI 4203](#) - Environmental Geophysics (3.0 cr)
- [ESCI 4204](#) - Geomagnetism and Paleomagnetism (3.0 cr)
- [ESCI 4212](#) - Geodynamics (3.0 cr)
- [ESCI 4401](#) - Aqueous Environmental Geochemistry (3.0 cr)
- [ESCI 4402](#) - Biogeochemical Cycles in the Ocean (3.0 cr)



- [ESCI 4404](#) - Analytical geochemistry for aqueous solutions and geological materials (3.0 cr)
- [ESCI 4501](#) - Structural Geology (3.0 cr)
- [ESCI 4502](#) - Tectonic Styles (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 4703](#) - Glacial Geology (4.0 cr)
- [ESCI 4801](#) - Geomicrobiology (3.0 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 5353](#) - Electron Microprobe Theory and Practice (3.0 cr)
- [ESCI 5503](#) - Advanced Petrology (3.0 cr)
- [ESCI 5705](#) - Limnogeology and Paleoenvironment (3.0 cr)
- [ESCI 5805](#) - Standards and Practices for Professional Geoscientists (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)
- [GCC 3038](#) - Human Threats to Ocean Health [ENV] (3.0 cr)
- [GCC 5008](#) - Policy and Science of Global Environmental Change [ENV] (3.0 cr)
- [ESCI 3002](#) - Climate Change and Human History [ENV] (3.0 cr)
or [ESCI 5102](#) - Climate Change and Human History (3.0 cr)
- [ESCI 3402](#) - Science and Politics of Global Warming [ENV] (3.0 cr)
or [ESCI 5402](#) - Science and Politics of Global Warming (3.0 cr)

Capstone

These field-based courses provide students with an opportunity to apply knowledge obtained in the classroom to practical real-world problems likely to be encountered as professional geoscientists. Both courses require students to make original observations and interpretations while they are outside in the field regarding advanced geologic mapping ([ESCI 4911](#)) and hydrogeologic methods ([ESCI 4971W](#)).

Take exactly 1 course(s) totaling exactly 4 credit(s) from the following:

Students who double major within CLA and choose to complete the capstone requirement in their other major are still required to take the Earth Sciences BA capstone.

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