### Earth Sciences

#### Freshman Year

<table>
<thead>
<tr>
<th>Fall Semester</th>
<th>Spring Semester</th>
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</thead>
<tbody>
<tr>
<td>Math 1371 Calculus I (placement into course, or pre-req)</td>
<td>Math 1372 Calculus II (1371)</td>
</tr>
<tr>
<td>Phys 1301W Intro Physics I (&amp;Math 1371)</td>
<td>Phys 1302W Intro Physics II (1301, &amp;Math 1372)</td>
</tr>
<tr>
<td>Chem 1061/65 Chem Princ I (placement into course, or 1015)</td>
<td>Chem 1062/66 Chem Princ II (1061/65)</td>
</tr>
<tr>
<td>CSE 100: 1st Yr Experience</td>
<td>Liberal Education course or Writ 130 (ESci 1007 recommended)</td>
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<tr>
<td>Liberal Education course or Writ 1301 (ESci 1007 recommended)</td>
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</tbody>
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#### Sophomore Year

<table>
<thead>
<tr>
<th>Fall Semester</th>
<th>Spring Semester</th>
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<tbody>
<tr>
<td>Math 2373 or 2374 (1372)</td>
<td>ESci 2202 Earth History (2201, 2301)</td>
</tr>
<tr>
<td>ESci 2301 Minerology (&amp;Chem 1061/65, &amp;Math 1371)</td>
<td>ESci 3891 Field Methods</td>
</tr>
<tr>
<td>Liberal Education course</td>
<td>Focus Area Course</td>
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<tr>
<td>Liberal Education course</td>
<td>Liberal Education course</td>
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† Summer after sophomore or junior year: ESci 4911W: Adv. Field Geology or 4971W: Hydrogeology (4 credits)

### About This Plan

- This plan is not a contract. Curriculum can change.
- Shaded courses are only offered in the indicated semester.
- Course pre-requisites and co-requisites (designated by &) are listed below the course number and title.
- Students can take either the CSE-only or University-wide versions of the math course (Math 1371/1271, 1372/1272, 2373/2243, 2374/2263).
- Students can take ESci 3911 and 4911W/4971W in the same summer.
- Chemical Principles labs (1065/1066) must be taken concurrently with the lectures (1061/1062).
- Liberal Education and Writing requirements with an (*) will be fulfilled by taking courses required for this major at UM-TC.

### Applying to your Major

Students who have completed the required courses for admission to this major and have a 3.2 UM-TC technical GPA at the end of the fall semester will be guaranteed admission. All other students who have completed the required courses will be considered for admission on a space-available basis. Admission following the spring semester is only based on space availability. The major application database is available at z.umn.edu/csemajorapp.

### Department Contact Information

- Website: www.esci.umn.edu
- Main Phone: 612-624-1333
- Main Office: 108 Pillsbury Hall
- Director of Undergraduate Studies: Professor Josh Feinberg
- Email: feinberg@umn.edu

### Liberal Education Information

All students must complete the following Writing & Liberal Education requirements, as noted on their APAS report. See link for full Core & Theme names: z.umn.edu/liberaleducation

#### Writing Requirements:

- **University Writing:** Writ 1301/1401 or equivalent

#### Writing Intensive (WI):

- **Two:** 1xxx or 2xxx level **
- **One:** 3/4/5xxx level (in major)**
  - One: 3/4/5xxx level (any dept.)

### Liberal Education Information

- CORES:
  - Bio
  - Phy*
  - His
  - SoS
  - Ltr
  - AH
  - Mth*

- THEMES:
  - 4 of 5:
    - Cw
    - Dsj
    - Env
    - Gp
    - Ts

### Total Credits Needed for Degree: 120
What can I do with a major in earth sciences?

Earth scientists, also known as geoscientists, are caretakers of the Earth’s resources and environment. Investigating the Earth, its soils, oceans, and atmosphere; forecasting the weather; developing land-use plans; exploring other planets and the solar system; determining environmental impacts; and finding new sources of useful materials are just a few examples of what geoscientists do. Geoscientists provide essential information for solving problems and establishing governmental policies for resource management, environmental protection, and public health. Other areas of earth science include geology, geophysics, hydrology, meteorology and oceanography.

Geologists study the composition, structure and history of the Earth’s crust. They investigate the formation of rocks and landscapes and how they have changed since their formation. Geologists apply knowledge of chemistry, physics, biology, and math to problems such as finding oil, ores and water. They may also decide which sites can safely support structures and advise on how to minimize environmental damage from natural hazards such as floods, landslides, or earthquakes.

Geophysicists study not only the Earth’s surface, but also its internal composition, ground and surface waters, atmosphere, oceans, and magnetic, electrical, and gravitational forces.

Hydrologists study the distribution, flow, and composition of underground and surface waters. They may work to address problems of water supply, irrigation, erosion, and flood control.

Oceanographers study tides, winds, currents, fish, seaweed, and the sediments, valleys, and mountain ranges of the ocean floor. Their work aids weather prediction, fisheries, resource discovery and retrieval, and national defense.

With the aid of data obtained from satellites, aircraft, and ground stations, meteorologists study winds, clouds, temperature patterns, and precipitation.

Employers (sample listing)

- Schlumberger
- British Petroleum/Amoco
- Cities and Municipalities
- MN/DOT
- National Parks
- Dow AgroSciences
- Nalco Chemical Company
- Federal Highway Administration
- Gamesa Energy
- Flint Hills Resources
- Forest Exploration Center
- Como Park Zoo & Conservatory
- ExxonMobil
- Army Corps of Engineers
- Pace Analytical Services, Inc.
- U.S. Steel
- Barr Engineering Company
- ALLETE/Minnesota Power

Industries (sample listing)

- Civil engineering
- Mining
- Paleontology
- Mineral energy
- Government agencies
- Text and map publishers
- Physiography
- Economic geology
- Structural/subsurface geology
- Environmental
- Oil/petroleum

Positions (sample listing)

**Economic Geologist:** Explores and develops metallic and nonmetallic resources, studies mineral deposits, and finds environmentally safe ways to dispose of waste materials from mining activities.

**Environmental Geologist:** Studies the interaction between the geosphere, hydrosphere, atmosphere, biosphere, and human activities. Environmental geologists work to solve problems associated with pollution, waste management, urbanization, and natural hazards, such as flooding and erosion.

**Mineralogist:** Studies mineral formation, composition, and properties.

**Petrologist:** Takes observational, chemical, and physical data and uses them to develop theories on the origin of rocks.

**Volcanologist:** Studies and researches volcanoes and predicts when the next eruptions will occur.

**Seismologist:** Studies earthquakes, including how they form and their patterns. Seismologists interpret the structure of the earth through the study of earthquakes, and also predict earthquakes.

**Paleontologist:** Studies fossils to learn about life in prehistoric times.

**Soil Scientist:** Studies soil and deals with agricultural issues and solutions.

**Petroleum Scientist:** Searches for and develops oil and natural gas resources.