## Geoengineering

### Freshman Year

<table>
<thead>
<tr>
<th>Fall Semester</th>
<th>Spring Semester</th>
</tr>
</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 (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 Prin II (1061/65)</td>
</tr>
<tr>
<td>Lib Ed or Writ 1301/1401</td>
<td>Lib Ed or Writ 1301/1401</td>
</tr>
<tr>
<td>CSE 1001: 1st Yr Experience</td>
<td></td>
</tr>
</tbody>
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### Sophomore Year

<table>
<thead>
<tr>
<th>Fall Semester</th>
<th>Spring Semester</th>
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</thead>
<tbody>
<tr>
<td>Math 2374 Multivar. Calc (1372)</td>
<td>Math 2373 Lin Alg/Diff Eq. (1372)</td>
</tr>
<tr>
<td>ESci 2201 Solid Earth Dyna</td>
<td>CEGE 3101 Comp App I (CSE, Phys 1301, Math 1372)</td>
</tr>
<tr>
<td>ESci 2301 Mineralogy (&amp;Chem 1061/65, &amp;Math 1371)</td>
<td>ESci 3891 Field Methods</td>
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### Junior Year

<table>
<thead>
<tr>
<th>Fall Semester</th>
<th>Spring Semester</th>
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<tbody>
<tr>
<td>ESci 4501 Structural Geology (ESci 2201, 2302)</td>
<td>CEGE 3102 Uncert &amp; Dec Analy (Math 1372)</td>
</tr>
<tr>
<td>CEGE 3501 Environ Engrg (Chem 1062/66, Phys 1302)</td>
<td>CEGE 4121 Comp Apps II (UD, 3101, Math 2373, 2374)</td>
</tr>
<tr>
<td>CEGE 3502 Fluid Mechanics (CSE, AEM 2012 or 3031, Math 2373)</td>
<td>AEM 2012 Dynamics** (2011, Math 2374, &amp;Math 2373)</td>
</tr>
<tr>
<td>CEGE 3301 Soil Mechanics I (CSE, AEM 3031)</td>
<td>ESci 2302 Petrology*** (2301)</td>
</tr>
<tr>
<td>Liberal Education course</td>
<td>Technical Elective I</td>
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### Senior Year

<table>
<thead>
<tr>
<th>Fall Semester</th>
<th>Spring Semester</th>
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</thead>
<tbody>
<tr>
<td>CEGE 4311 Rock Mechanics (UD, 3301)</td>
<td>CEGE 4102W Capstone Design (4301, 4401, 4501, 4502)</td>
</tr>
<tr>
<td>ESci Technical Elective</td>
<td>Technical Elective II</td>
</tr>
<tr>
<td>CEGE Technical Elective</td>
<td>Technical Elective III</td>
</tr>
<tr>
<td>CEGE 4351 Groundwater Mech (UD, 3502)</td>
<td>Liberal Education course</td>
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### About This Plan

- This plan is not a contract. Curriculum can change.
- Prior to fall 2015, CEGE courses were listed with CE or GeoE course designators.
- Shaded courses are only offered in the indicated semester.
- Course pre-requisites and co-requisites (designated by &k) are listed below the course number and title. UD requires admission to the major prior to enrollment.
- Students can take either the CSE-only or University-wide versions of the math course (Math 1371/1271, 1372/1272, 2373/2243, 2374/2263).
- **ESci 2201 can substitute for ESci 2302**
- **AEM 2012 can substitute for AEM 2011; students must also then take an alternative course for AEM 2012.**
- **Double boxed courses are required for application to this major.**
- Chemical Principles labs (1061/1062) 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

- Main Phone: 612-625-5522
- Main Office: 122 Civil Engineering Building
- Director of Undergraduate Studies: Dr. Randal Barnes
- Email: barne003@umn.edu

### University Degree Requirements

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](http://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

<table>
<thead>
<tr>
<th>CORES:</th>
<th>THEMES:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bio</td>
<td>4 of 5</td>
</tr>
<tr>
<td>Mth*</td>
<td>Civ</td>
</tr>
<tr>
<td>Phy</td>
<td>DSJ</td>
</tr>
<tr>
<td>His</td>
<td>Env*</td>
</tr>
<tr>
<td>SoS</td>
<td>GP</td>
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<tr>
<td>Ltr</td>
<td>TS</td>
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</table>

## Total Credits Needed for Degree: 125
What can I do with a major in geological engineering?

Geological engineering is the application of the earth sciences to human problems that relate to the Earth. It is a broad, interdisciplinary field with many specialty areas such as geotechnical site investigation for a variety of projects; rock and soil slope stability; environmental site characterization and planning; hydrogeology; groundwater studies and engineering; natural and manmade hazard investigations; and exploration and development of fossil fuel and mineral deposits. Geological engineers carry out site investigations for dams, plants, roads, railways, housing projects, mines, and quarries, pipelines, petroleum production, forestry operations, and more. They interact with civil engineers to design essential parts of projects and they are responsible for environmental assessments or clean-up activities where pollution has occurred. Geological engineers prospect for minerals, building material resources and drinking water. They carry out hazard and risk assessments and mapping for landslides and earthquakes. Geological engineers solve engineering problems and design engineering systems with, on, and in geological materials, while at the same time protecting the environment. They may evaluate a site on which a tunnel, dam, or road might be built or examine ways to search for and harvest energy resources. Geological engineers also discover ways to protect the earth while still exploiting it through careful industrial practices.

Specializations include geoenvironmental engineering (preserving the environment through managing pollution) and geomechanical engineering (interpreting the geological variables in structural foundations and evaluating natural geological hazards).

**Employers (sample listing)**
- Schlumberger
- BP
- Cities and Municipalities
- MN/DOT
- Accenture
- Epic Systems
- WSP Environment & Energy
- FM Global
- Federal Highway Administration
- Monsanto
- Minnesota Builders Exchange
- ExxonMobil
- Alliant Energy
- Honeywell
- General Electric
- Exponent
- US Compliance Corporation
- Cliffs Natural Resources, Inc
- Esri
- U.S. Steel
- Barr Engineering Company

**Industries (sample listing)**
- Civil engineering firms
- Mining
- Research and development
- Energy
- Minerals
- Federal government
- Consulting
- Physiography
- Environmental
- City/County municipalities
- Hazardous waste
- Petroleum

**Positions (sample listing)**

**Environmental Scientist:** Conducts an assessment of groundwater and surface water supplies, assists water utilities, and reviews plans and projects proposed and conducted by the public and private sectors to assist in the development and implementation of water resource management policies.

**Geomechanical Engineer:** Applies the principles of engineering and geology to the study of geological materials including soil, ground water, and rock foundations.

**Hydrogeologist:** Conducts a range of field activities including drilling, monitoring well installation, sampling, and overseeing contractors. Hydrogeologists evaluate and interpret field and sampling data, develop conclusions concerning site conditions based on data analysis, and prepare written plans and reports related to site investigation and remediation activities.

*Some positions may require an advanced degree.*

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**Career Center**
cse.umn.edu/career

**Salary Information**
z.umn.edu/csesalary

**More Information on Undergraduate Majors**
cse.umn.edu/majors