### Materials Science & Engineering

**Freshman Year**

<table>
<thead>
<tr>
<th>Fall Semester</th>
<th>Spring Semester</th>
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</table>
| Math 1371 Calculus I  
(placement into course, or pre-req) | Math 1372 Calculus II  
(1371) |
| Phys 1301W Intro Physics I  
(&Math 1371) | Phys 1302W Intro Physics II  
(1301, &Math 1372) |
| Chem 1065 Chem Princ I Lab  
(&1061) | Chem 1066 Chem Princ II Lab  
(1061/65, &1062) |
| Chem 1061 Chem Princ I  
(placement into course or 1015, &1065) | Chem 1062 Chem Princ II  
(1061/65, &1066) |
| ChEn/MatS 1001 (optional) | Liberal Education course or Writ 1301 |
| Liberal Education course or Writ 1301 |  |

### Sophomore Year

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<tr>
<th>Fall Semester</th>
<th>Spring Semester</th>
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</table>
| Math 2374 Multivariable Calc  
(1372) | Chem 2301 Organic Chem I  
(Chem 1062/1066) |
| AEM 3011 Statics  
(Phys 1301, &Math 2374) | Phys 2303 Physics III: Matter  
(1302) |
| MatS 3011 Intro MatSci  
(Chem 1061/65, Math 1372, Phys 1302) | Liberal Education course |
| Liberal Education course | Liberal Education course |

### Junior Year

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<tr>
<th>Fall Semester</th>
<th>Spring Semester</th>
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| MatS 3001 Thermodynamics  
(UD) | MatS 3002 Mass Trans & Kin  
(UD, 3001, Math 2373, CEGE 3101 or &3141) |
| MatS 3012 Metals and Alloys  
(UD, 3011) | MatS 3141 Numerical Methods*  
(UD, 3011, 3001, Math 2373, Math 2374, Chem 4502/Phys 2303) |
| MatS 3013 Electrical Mats  
(UD, 3011, Chem 4502/Phys 2303) | MatS 3851W Matsls Prop Lab  
(UD, 3013, 3801) |
| MatS 3801 Struct Char Lab  
(UD, 3011) | MatS 4214 Polymers  
(UD, 3011, 3001, Chem 2301) |
| Liberal Education course | Technical Elective I |

### Senior Year

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<tr>
<th>Fall Semester</th>
<th>Spring Semester</th>
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</table>
| MatS 4212 Ceramics  
(UD, 3011, 3001) | AEM 4511 Composite Mats  
(UD, 3031) |
| MatS 4221 Mat Performance  
(UD, 3012, AEM 3031) | MatS 4301W Mat Processing  
(4212, &4214) |
| Technical Elective II | Technical Elective III |
| Technical Elective IV |  |

### Total Credits Needed for Degree: 124

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**About This Plan**

- This plan is not a contract. Curriculum can change. The APAS is the official method for tracking completion of University degree requirements.
- 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. Upper Division (UD) requires admission to the major prior to enrollment.
- Students can take either CSE-only or University-wide versions of the math courses (1371/1271, 1372/1272, 2373/2243, 2374/2263).
  *MatS 3141 should not be taken if student has already completed CEGE 3101.

**Applying to your Major**

Students who have completed the required courses for admission to this major (double-boxed and one with dashed outline on plan) 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.

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**Department Contact Information**

- Website: cems.umn.edu/academics/mse/
- Main Phone: 612-625-1313
- Main Office: 151 Amundson Hall
- Director of Undergraduate Studies: Professor David Flannigan
- Departmental Advisor: Kacey Gregerson; kgregers@umn.edu

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**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

**Writing Requirements:**

**University Writing:**
Write 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.)*

Requirements with an (*) will be fulfilled by taking courses at UM-TC required for this major.

**Liberal Education**

<table>
<thead>
<tr>
<th>CORES:</th>
<th>THEMES:</th>
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<tbody>
<tr>
<td>Bio</td>
<td>4 of 5:</td>
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<tr>
<td>Phy*</td>
<td>Civ</td>
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<td>His</td>
<td>DSJ</td>
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<td>AH</td>
<td>TS</td>
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<td>Mth*</td>
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Materials Science and Engineering

POSSIBLE POSITIONS

- **Manufacturing engineer**: Plans the tooling, construction, and assembly of the product as dictated by design specifications.
- **Materials consultant**: Serves as expert in one area of materials and is familiar with past experiments and theories related to the hiring firm's proposed project.
- **Materials engineer**: Works on the structure, processing, properties and performance of engineering materials.
- **Materials testing**: Tests materials properties and performance in applications; can involve mechanical, electrical, optical, magnetic, structural properties, etc.
- **Operations engineer**: Works on-site, spending time ensuring that the plant is producing the right amount of product to the correct specification.
- **Process engineer**: Develops and maintains the processes required to synthesize, purify, process, shape, and control materials.
- **Product engineer**: Follows the production cycle of a new product or variations of existing products to ensure they are meeting specification. May work with marketing and R&D to ensure that a product will meet customer needs.
- **Research and development scientist/engineer (R&D)**: Researches structure, processing, properties and performance of materials for the development and use of applications in technology.
- **Quality engineer**: Supports development and ensures compliance with the company’s quality management system (QMS) and provides technical support to product engineering, marketing, manufacturing, etc.

**Some of these positions may require an advanced degree.**

INDUSTRIES

- Aerospace
- Automotive
- Biomedical devices
- Chemical products
- Consulting
- Electronics/microelectronics
- Energy
- Failure analysis
- Government agencies/labs
- Healthcare
- Materials processing
- Optical devices/coatings
- Packaging engineering
- Petroleum
- Polymer resins/polymer/plastics
- Quality control
- Semiconductors
- Telecommunications

EMPLOYERS

- 3M
- Abbott
- Andersen Corporation
- Appvion, Inc.
- Bostik, Inc.
- Boston Scientific
- Brady Corporation
- Cargill
- Ecolab
- Ford Motor Company
- General Mills
- H.B. Fuller
- Honeywell
- Medtronic
- Micron Technology
- Seagate Technology
- Schlumberger
- Stratasys
- Target Corporation
- Vision-Ease

CSE Career Outcomes

Average Starting Salary: $59,036*

Post-graduation Outcomes:*  
- Grad School: 15.1%
- Employed: 83%
- Other: 1.9%

*Salary and Career Outcomes gathered from the 2016-2017 CSE Graduation Survey
Post-graduation outcomes reflect the percentage of students who were employed full-time in their field or were enrolled in a graduate program.

More Information

Career Center: cse.umn.edu/career
Salary Information: z.umn.edu/csesalary
More Information on Undergraduate Majors: cse.umn.edu/majors

Please visit the Career Center to continue exploring this major.