



### **Twin Cities Campus**

## **Materials Science and Engineering B.Mat.S.E.**

*Chemical Engineering & Materials Science*

### **College of Science and Engineering**

- Program Type: Baccalaureate
- Requirements for this program are current for Spring 2012
- Required credits to graduate with this degree: 128
- Required credits within the major: 38
- Degree: Bachelor of Materials Science and Engineering

The program in materials science and engineering leads to a bachelor's degree that enables students to immediately enter the profession. The program develops an understanding of the properties and the origin of these properties in a broad range of materials, including metals, ceramics, semiconductors, polymers, and composites. Because the program is broadly based, graduates find employment across a range of industries, including the automotive, chemical, electronics, energy, and medical technology industries. Graduates also find positions in consulting, research, technical management, and teaching.

The Materials Science and Engineering (MSE) program is designed to prepare students to achieve the following career and professional accomplishments after graduation:

- \* Be employed as a materials engineer or a related engineering or science position, using and developing his or her skills based on the demands of the job.
- \* Enter into a graduate or professional program, applying his or her knowledge and experience toward an advanced or professional degree.
- \* Be an effective team member, using and developing communication and teamwork skills.
- \* Be a responsible engineer/scientist or professional, demonstrating ethical and professional responsibility and continuing to learn through formal and informal educational experiences.

## **Program Delivery**

This program is available:

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

## **Admission Requirements**

Students must complete 11 courses before admission to the program.

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

Students interested in materials science and engineering are recommended to take MATS 1001/CHEN 1001 to learn more about the field.

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

### **Required prerequisites**

#### **Mathematics**

- MATH 1271 - Calculus I [MATH] (4.0 cr)  
or MATH 1371 - CSE Calculus I [MATH] (4.0 cr)
- MATH 1272 - Calculus II (4.0 cr)  
or MATH 1372 - CSE Calculus II (4.0 cr)
- MATH 2243 - Linear Algebra and Differential Equations (4.0 cr)  
or MATH 2373 - CSE Linear Algebra and Differential Equations (4.0 cr)
- MATH 2263 - Multivariable Calculus (4.0 cr)  
or MATH 2374 - CSE Multivariable Calculus and Vector Analysis (4.0 cr)

#### **Physical Sciences**

- AEM 2011 - Statics (3.0 cr)
- CHEM 1021 *{Inactive}*[PHYS] (4.0 cr)  
or CHEM 1031H *{Inactive}*[PHYS] (4.0 cr)
- CHEM 1022 *{Inactive}*[PHYS] (4.0 cr)  
or CHEM 1032H *{Inactive}*[PHYS] (4.0 cr)
- CHEM 2301 - Organic Chemistry I (3.0 cr)
- 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)  
[PHYS 2303](#) - Physics III: Physics of Matter (4.0 cr)  
or [PHYS 2403H](#) *{Inactive}* (4.0 cr)

## 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

### Major Courses

[AEM 3031](#) - Deformable Body Mechanics (3.0 cr)  
[AEM 4511](#) - Mechanics of Composite Materials (3.0 cr)  
[CEGE 3101](#) - Computer Applications I (3.0 cr)  
[MATS 3011](#) - Introduction to Materials Science and Engineering (3.0 cr)  
[MATS 3012](#) - Metals and Alloys (3.0 cr)  
[MATS 3801](#) - Structural Characterization Lab (4.0 cr)  
[MATS 3851W](#) - Materials Properties Lab [WI] (4.0 cr)  
[MATS 3001](#) - Thermodynamics of Materials (3.0 cr)  
[MATS 3002](#) - Mass Transport and Kinetics (3.0 cr)  
[MATS 3013](#) - Electrical and Magnetic Properties of Materials (3.0 cr)  
[MATS 4212](#) - Ceramics (3.0 cr)  
[MATS 4214](#) - Polymers (3.0 cr)  
[MATS 4221](#) - Materials Performance (4.0 cr)  
[MATS 4301W](#) - Materials Processing [WI] (4.0 cr)  
[MATS 4400](#) - Senior Design Project (3.0 cr)

### Technical Electives

Students must take 13 credits of technical electives. See an adviser for a list of possible courses.

## Program Sub-plans

A sub-plan is not required for this program.

### Honors UHP

This is an honors sub-plan.

Students admitted to the University Honors Program (UHP) must fulfill UHP requirements in addition to degree program requirements. Honors courses used to fulfill degree program requirements will also fulfill UHP requirements.

Current departmental honors course offerings are listed at:  
[http://www.honors.umn.edu/academics/curriculum/dept\\_courses\\_current.html](http://www.honors.umn.edu/academics/curriculum/dept_courses_current.html)

Honors students complete an honors thesis project in the final year, most often in conjunction with an honors thesis course, or with an honors directed studies or honors directed research course. Students select honors courses and plan for a thesis project in consultation with their UHP adviser and their departmental faculty adviser.