***Duluth Campus***

# Applied Materials Science M.S.

*Chemical Engineering*

**Swenson College of Science and Engineering**

Link to a list of faculty for this program.

- Program Type: Master's
- Requirements for this program are current for Fall 2020
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Materials science and engineering (MSE) is a field that studies the structure, property, processing and performance of materials. The MS program in applied materials science (AMS) aims to train students to handle, lead and excel at research and development projects in the field of materials science and technology. Through unique interdisciplinary and practice oriented teaching, students will be trained for careers in wide variety of fields such as aerospace, biomedical, and energy. Collaboration with regional industry partners combined with the expertise of instructors will ensure a program that will help our graduates to succeed in their respective careers.

Completion of the MS AMS program requires a minimum of 30 credit hours, which include 12 hours of required courses, 10 thesis credit hours, and at least 8 hours of elective courses.

## Program Delivery

This program is available:

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

## Prerequisites for Admission

The preferred undergraduate GPA for admittance to the program is 3.00.

BA or BS degree in engineering, chemistry, physics, or similar fields; other undergraduate degrees may be accepted with additional coursework required prior to beginning the program.

Other requirements to be completed before admission:
Applicants whose native language is not English must submit score(s) from one of the following tests: TOEFL, IELTS or MELAB.

Applicants must submit their test score(s) from the following:

- GRE
  - General Test - Verbal Reasoning: 550
  - General Test - Quantitative Reasoning: 600

International applicants must submit score(s) from one of the following tests:

- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- IELTS
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations(GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

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Information current as of March 29, 2024

## Program Requirements

**Plan A:** Plan A requires 20 major credits, 0 credits outside the major, and 10 thesis credits.The final exam is oral.

**Plan B:** Plan B requires 30 major credits and 0 credits outside the major.The final exam is oral. A capstone project is required.
**Capstone Project:** Master's of applied science project work as determined by faculty advisor and student with approval by the program director of graduate studies.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

**Core Requirements (12 cr)**
AMS 5101 - Materials Analysis & Design I (4.0 cr)
AMS 5102 - Materials Analysis and Design Lab I (2.0 cr)

**Plan A or Plan B**
**Plan A**
**Electives**
Only 6 elective credits may be taken at the 4xxx level.
Take 8 or more credit(s) from the following:
•CE 5027 - Advanced Concrete Materials and Repair (3.0 cr)
•CHE 4141 - Material and Minerals Processing (3.0 cr)
•CHE 4142 - Extractive Metallurgy: An Introduction to metals' extraction (3.0 cr)
•CHE 5131 - Polymer Engineering (3.0 cr)
•CHE 5711 - Biomedical Engineering (3.0 cr)
•CHEM 4373 - Physical Biochemistry: Statistical Bio-Thermodynamics (3.0 cr)
•CHEM 4374 - Physical Biochemistry Laboratory (2.0 cr)
•CHEM 5510 - Polymer Chemistry (3.0 cr)
•CHEM 5650 - Computational Chemistry (3.0 cr)
•CHEM 5714 - Applications of Spectroscopy (4.0 cr)
•EE 4611 - Introduction to Solid-State Semiconductors (3.0 cr)
•EE 5621 - Microelectronics Technology (3.0 cr)
•EES 5321 - Theory, Practice of Scanning Electron Microscopy and X-Ray Microanalysis in Lectures (3.0 cr)
•IE 5325 - Advanced Engineering Economics (3.0 cr)
•ME 5220 - Advanced Mechanics of Materials (3.0 cr)
•ME 5315 - Nondestructive Evaluation of Engineering Materials (3.0 cr)
•ME 5345 - Smart Materials and Structures (3.0 cr)
•PHYS 5041 - Optics (3.0 cr)
•PHYS 5531 - Introduction to Solid State Physics (3.0 cr)
**Thesis credits**
AMS 8777 - Thesis Credits: Master's (1.0 - 10.0 cr)
*or* **Plan B**
Only 6 elective credits may be taken at the 4xxx level.
Take 15 or more credit(s) from the following:
•CE 5027 - Advanced Concrete Materials and Repair (3.0 cr)
•CHE 4141 - Material and Minerals Processing (3.0 cr)
•CHE 4142 - Extractive Metallurgy: An Introduction to metals' extraction (3.0 cr)
•CHE 5131 - Polymer Engineering (3.0 cr)
•CHE 5711 - Biomedical Engineering (3.0 cr)
•CHEM 4373 - Physical Biochemistry: Statistical Bio-Thermodynamics (3.0 cr)
•CHEM 4374 - Physical Biochemistry Laboratory (2.0 cr)
•CHEM 5510 - Polymer Chemistry (3.0 cr)
•CHEM 5650 - Computational Chemistry (3.0 cr)
•CHEM 5714 - Applications of Spectroscopy (4.0 cr)
•EE 4611 - Introduction to Solid-State Semiconductors (3.0 cr)
•EE 5621 - Microelectronics Technology (3.0 cr)
•EES 5321 - Theory, Practice of Scanning Electron Microscopy and X-Ray Microanalysis in Lectures (3.0 cr)
•IE 5325 - Advanced Engineering Economics (3.0 cr)
•ME 5220 - Advanced Mechanics of Materials (3.0 cr)
•ME 5315 - Nondestructive Evaluation of Engineering Materials (3.0 cr)
•ME 5345 - Smart Materials and Structures (3.0 cr)
•PHYS 5041 - Optics (3.0 cr)
•PHYS 5531 - Introduction to Solid State Physics (3.0 cr)
**Capstone Project**
AMS 5555 - Applied Materials Science Project Credits (3.0 - 6.0 cr)

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