



Duluth Campus

Applied Materials Science M.S.

UMD-Civil Engineering, Dept of

Swenson College of Science and Engineering

Link to a [list of faculty](#) for this program.

Contact Information:

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Website: <https://scse.d.umn.edu/graduate-programs/ms-materials-science>

- Program Type: Master's
- Requirements for this program are current for Fall 2022
- 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 a 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.

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:

The GRE is optional.

Special Application Requirements:

International and domestic applicants whose first language is not English must submit current score(s) from one of the following tests:

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](#)(TOEFL, IELTS, MELAB).

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

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: The Plan B project comprises 3 credits of AMS 5555 completed in consultation with the advisor

This program may be completed with a minor.

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

Use of independent study or special topics courses toward program requirements is permitted under certain conditions with advisor approval.

Core Requirements (13 credits)

Take the following courses:

- AMS 5101 - Materials Analysis & Design I (4.0 cr)
- AMS 5102 - Materials Analysis and Design Lab I (2.0 cr)
- AMS 5201 - Materials Analysis and Design II (4.0 cr)
- AMS 5202 - Materials Analysis and Design Lab II (2.0 cr)
- AMS 8099 - Graduate Seminar (1.0 cr)

Electives (7 to 14 credits)

Plan A students select 7 credits, and Plan B students select 14 credits from the following in consultation with the advisor. No more than 6 credits of 4xxx-level coursework can be applied as electives.

- 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 4231 - Solar Energy and Photovoltaics (3.0 cr)
- CHE 5021 - Transport Phenomena (3.0 cr)
- CHE 5121 - Advanced Thermodynamics (3.0 cr)
- CHE 5131 - Polymer Engineering (3.0 cr)
- CHE 5621 - Particle Technology (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)

Plan Options

Plan A

Thesis Credits

Take 10 master's thesis credits.

- AMS 8777 - Thesis Credits: Master's (1.0 - 10.0 cr)

-OR-

Plan B

Capstone Project (3 credits)

Take 3 project credits.

- AMS 5555 - Applied Materials Science Project Credits (3.0 - 6.0 cr)