

MATERIALS SCIENCE AND ENGINEERING, MS

Degree: Master of Science (MS)

Field of Study: Materials Science and Engineering

Program Overview

The Department of Materials Science and Engineering offers a program leading to the degree of MS (Master of Science). The (same) MS degree can be obtained by three different master's tracks, addressing specific needs of different groups of graduate students. Each master's program prepares students for an advanced professional career by profoundly deepening their understanding and knowledge of materials science and engineering beyond the basics.

Graduate Policies

For graduate policies and procedures, please review the School of Graduate Studies section of the General Bulletin.

Program Requirements

The (same) degree of MS (Master of Science) in Materials Science and Engineering is awarded through one of the following three programs.

"Research" (Thesis-Focused) Master's Track

This plan is appropriate for full-time graduate students. It requires a total of 30 credit hours (units). The coursework component comprises successful completion of 7 courses (21 credit hours/units). 1 course can be 300-level, all others must be 400- or higher level. Up to 2 courses can be from an engineering or science curriculum outside the department. The minimum cumulative GPA is 3.0. Students with lower standing will be placed on academic probation. Up to 6 hours of course credit can be transferred from graduate level courses (grade B or better) taken at another university in excess of their BS degree requirements. The thesis component consists of individual research (EMSE 651 Thesis M.S.), totaling no fewer than 9 credit hours (units), and a final oral defense. The examining committee includes 3 faculty members of the department. Additional committee members may be added at the discretion of the student in consultation with their advisor. A PPOS (planned program of study) must be submitted by the end of the second semester, prepared by the student the advisor and submitted online to the School of Graduate Studies.

"Professional" (Project-Focused) Master's Track

This program suites part-time graduate students, e.g. while employed elsewhere as materials engineers. The coursework component comprises successful completion of 9 courses (27 credit hours/units). 1 course can be 300-level, all others must be 400- or higher level. Up to 2 courses can be from an engineering or science curriculum outside the department. The minimum cumulative GPA is 3.0. Students with lower standing will be placed on academic probation. Up to 6 hours of course credit can be transferred from graduate level courses (grade B or better) taken at another university in excess of their BS degree requirements. The program involves a project, typically 3 credit hours/units (EMSE 649 Special Projects) and completed in a single semester, and a final comprehensive oral exam. The examining committee consists of three faculty members of the department. Additional committee members

may be added at the discretion of the student in consultation with their advisor. An Academic Program must be submitted by the end of the second semester, prepared by the student the advisor and submitted online to the School of Graduate Studies.

"Accelerated" (Course-Focused) Master's Track

Materials science and engineering is a discipline that extends from the basic science of materials micro-structure and properties to the design and evaluation of materials in engineering systems. Data science and analytics seeks to identify statistically significant relationships, model development, and predictive behavior of large data sets generated by e.g. manufacturing technologies. The Accelerated Master's Track is a *course-work-only* program that extends classical education in materials science and engineering with data science and analytics. It can be completed in just one calendar year!

The suggested program of study includes 10 courses, taken over the fall-, spring-, and summer semester of one academic year.

- Fall Semester:
 - DSCI 451 Exploratory Data Science, EMSE 504 Thermodynamics of Solids, EMSE 503 Structure of Materials, EMSE 413 Fundamentals of Materials Engineering and Science, and EMSE 599 Critical Review of Materials Science and Engineering Colloquium for either 1 or 2 credit hours.
- Spring Semester:
 - EMSE 505 Phase Transformations, Kinetics, and Microstructure, EMSE 414 Electrical, Magnetic, Optical, and Thermal Properties of Materials, one EMSE-400-level elective course, DSCI 453 Data Science: Statistical Learning, Modeling and Prediction, and EMSE 599 Critical Review of Materials Science and Engineering Colloquium for either 1 or 2 credit hours (units), adding up to a total of 3 credit hours (units) of EMSE 599.
- Summer Semester:
 - DSCI 452 Applied Data Science Research, EMSE 515 Analytical Methods in Materials Science and the following optional courses of:
 - DSCI 432 Spatial Statistics for Near Surface, Surface, and Subsurface Modeling, DSCI 452 Applied Data Science Research, DSCI 454 Data Visualization and Analytics.

The 3 credit hours (units) of EMSE 599 can be replaced by an additional course of 3 credit hours (units), e.g. EMSE 468 Scientific Writing in Materials Science and Engineering.