Mechanical Engineering with Concentration in Mechanics and Design, MSME (Boston)

Overview

While pursuing a Master of Science in Mechanical Engineering with Concentration in Mechanics and Design (https://mie.northeastern.edu/academics/graduate-studies/ms-mece/), the students will study the motion, deformation, and failure of solid materials in response to the action of direct forces and external fields. The students will also get a chance to conduct research with faculty and observe how these studies will lead to key engineering innovations and designs. Using complementary analytical, computational, experimental, and design tools, the M&D faculty members conduct research in the design and analysis of engineered functional materials/structures, in mechanics of adhesion and contact, and in biomechanics and mechanobiology. For example, in our biomechanics research, we strive to close the gap between function, form, and disease in the bone by using experimental and computational techniques; also, we explore the mechanics of lipid-based drug delivery vesicles. At the small length scales, we are creating a new understanding of nanomechanics, contact mechanics, tribology, MEMS, and the application of nanomaterials for energy storage systems. Our research and teaching together are designed to prepare students to understand and exploit mechanics to enable their future engineering innovations.

General Degree Requirements

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved coursework (exclusive of any preparatory courses) with a minimum grade-point average of 3.000. Students can complete a master's degree by pursuing any of one of the three tracks: coursework option, project option, and thesis option. Specific degree requirements for each of these tracks can be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

Academic and Research Advisors

All nonthesis students are advised by the faculty advisor designated for their respective concentration or program. Students willing to pursue the thesis option must first find a research advisor within their first year of study. The research advisor will guide the students' thesis work, and thesis reader(s) may be assigned at the discretion of their research advisor. The research advisor must be a full-time or jointly appointed faculty. If the research advisor is outside the MIE department, before the thesis option can be approved, a faculty member with 51 percent or more appointments in the MIE department must be chosen as co-advisor, and a petition must be filed and approved by the co-advisor and the MIE Graduate Affairs Committee. Thesis option students are advised by the faculty advisor of their concentration before they select their research advisor(s). The research advisor and co-advisor must serve as thesis readers.

Plan of Study and Course Selection

It is recommended that all new students attend orientation sessions held by the MIE department and the Graduate School of Engineering to acquaint themselves with the coursework requirements and research activities of the department as well as with the general policies, procedures, and expectations.

In order to receive proper guidance with their coursework needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study to the department before enrolling in second-semester courses. This form not only helps the students manage their coursework but it also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

Students pursuing study or research under the guidance of a faculty member can choose project option by taking Master's Project (ME 7945). An MS project must be petitioned to the MIE Graduate Affairs Committee and approved by both the faculty member (instructor for Master's Project) and the student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

Options for MS Students (Coursework Only, Project, or Thesis)

Students accepted into any of the MS programs in the MIE department can choose one of the three options: coursework only, project, or thesis. Please see the Program Requirements tab on the top menu of this page for more information. MS students who want to pursue project or thesis options must find, within the first year of their study, a faculty member or a research advisor who will be willing to direct and supervise a mutually agreed research project or MS thesis. Moreover, students who receive financial support from the university in the form of a research, teaching, or tuition assistantship must complete the thesis option (16 semester hours).

Students who complete the thesis option must make a presentation of their thesis before approval by the department. The MS thesis presentation shall be publicly advertised at least one week in advance and all faculty members and students may attend and participate. If deemed appropriate by the research advisor, other faculty members may be invited to serve as thesis readers to provide technical opinions and judge the quality of the thesis and presentation.

Change of Program/Concentration

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE Graduate Affairs Committee, the student must not be in the first semester of their current program, must have a 3.300 GPA, and have completed at least 8 semester hours of required coursework in their sought program at Northeastern.

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (https://catalog.northeastern.edu/graduate/engineering/graduate-certificate-programs/).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Mechanical Engineering with a Concentration in Mechanics and Design with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Mechanical Engineering with Concentration in Mechanics and Design in addition to earning a Graduate Certificate in Engineering Leadership (https://catalog.northeastern.edu/graduate/engineering/multidisciplinary/engineering-leadership-graduate-certificate/). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate will require 16 semester hours of advisor-approved mechanics and design technical courses. For students who concurrently enroll in the Graduate Certificate in Engineering Leadership, 16 semester hours of the certificate coursework may be applied to the elective requirements of this program's coursework option.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Mathematics Competency		
ME 6200	Mathematical Methods for Mechanical Engineers 1	4
Mechanics Competency		
Complete 12 semester hours from the following:		12
ME 5650	Advanced Mechanics of Materials	
ME 5654	Elasticity and Plasticity	
ME 5655	Dynamics and Mechanical Vibration	
ME 5657	Finite Element Method 1	
ME 5659	Control Systems Engineering	

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete 16 semester hours from the course list. (p. 3)		16

PROJECT OPTION

Code	Title	Hours
ME 7945	Master's Project	4
Complete 12 semester hours from the course list. (p. 3)		12

THESIS OPTION [1]

Code	Title	Hours
ME 7945	Master's Project	4
ME 7990	Thesis	4
Complete 8 semester hours from the course list. (p. 3)		8
In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.		

Optional Co-op Experience

Code	Title	Hours
Complete the following (students must complete ENCP 6100 to qualify for co-op experience):		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)
Minimum 3.000 GPA required

[1] Thesis option is required for all students who receive financial support from the university in the form of a research, teaching, or tuition assistantship.

Course List

Code	Title	Hours
Any course in the following list will fulfill the coursework option, provided the student satisfies prerequisites and program requirements (students can take courses outside this list with prior approval from the faculty advisor):		
ME 5240	Computer Aided Design and Manufacturing	
ME 5374	Special Topics in Mechanical Engineering (Fracture Mechanics and Adhesion in Biological Science)	
ME 5374	Special Topics in Mechanical Engineering (Inelasticity)	
ME 5658	Continuum Mechanics	
ME 5665	Musculoskeletal Biomechanics	
ME 6260	Introduction to Microelectromechanical Systems (MEMS)	
ME 7238	Finite Element Method 2	
ME 7374	Special Topics in Mechanical Engineering	
Any other ME or MATL course		