

# Biomedical Engineering, MS

## Requirements

The Master of Science in biomedical engineering requires a minimum of 30 s.h. of graduate credit and may be completed with or without a thesis. Students must maintain a UI cumulative grade-point average of at least 2.75 in all work for the degree. The MS may be a terminal degree or a step toward the PhD.

A tentative plan of study for each student is determined through consultation with an advisor. An MS committee of at least three faculty members, including at least two tenure-track biomedical engineering faculty, is required.

Requirements	Hours
Engineering Ethics and Graduate Seminar	3
Formal Coursework	21
Engineering Research or Elective Courses	6

## Engineering Ethics and Graduate Seminar

All students are required to complete ENGR:7270 Engineering Ethics (1 s.h.) in their first semester.

Attendance and participation in seminars are mandatory and important parts of graduate education. All biomedical engineering graduate students are required to register for and attend the weekly graduate seminar BME:5010 Seminar in Biomedical Engineering (1 s.h.) for two semesters.

In the case of a conflict, (for example, an internship out of town) a student may request to be excused from attending the graduate seminar. Please note course conflicts do not qualify for a waiver. In the instance where a student feels they may have a qualifying conflict, the student must obtain approval from the Director of Graduate Studies and explain the rationale for the request. Students would then be expected to make up the credits with additional electives or research in order to reach the minimum 30 s.h. required for the degree.

## Formal Coursework

The formal coursework requirement includes at least 6 s.h. in core courses. Additional graded engineering coursework brings the formal coursework total to 21 s.h. At least 18 s.h. of formal coursework must be taken on an A-F graded basis, including all core courses.

## Core Courses

Students are expected to complete the core courses during their first year of study.

Students may apply ME:5113 Mathematical Methods in Engineering to both the math requirement and the graded engineering courses requirement.

Core courses may be substituted by other equivalent courses at the discretion of the student's examining committee. Equivalent coursework taken as part of a student's undergraduate or graduate studies prior to starting the MS program at the University of Iowa may satisfy one or more of the core courses requirements. Students who wish to request

a substitution must submit a course substitution or waiver form. Forms may be obtained from the graduate program coordinator.

Course #	Title	Hours
One of these human physiology courses:		
BME:3260	Quantitative Physiology	3
HHP:3550	Human Physiology With Laboratory	5
One of these math courses:		
ME:5113/CBE:5140/CEE:5513	Mathematical Methods in Engineering (strongly recommended)	3
MATH:3720	Introduction to Abstract Algebra	4
MATH:3770	Foundations of Analysis	4
MATH:3800/CS:3700	Introduction to Numerical Methods	3
MATH:4050	Introduction to Discrete Mathematics	3
MATH:4250	Introduction to Financial Mathematics	3
MATH:4840	Mathematics of Machine Learning	3

## Graded Engineering Courses

The remaining formal coursework is selected from courses numbered 5000 or above in biomedical engineering (prefix BME), chemical and biochemical engineering (prefix CBE), civil and environmental engineering (prefix CEE), electrical and computer engineering (prefix ECE), industrial and systems engineering (ISE), or mechanical engineering (prefix ME), with some exclusions.

Students may also select from the following courses numbered below 5000.

Course #	Title	Hours
BME:4310/BMB:4310	Computational Biochemistry	3
CEE:4511/ME:4111	Scientific Computing and Machine Learning	3
CEE:4533/IGPI:4115	Finite Element I	3
ECE:3330/IGPI:3330	Introduction to Software Design	3
ISE:3400	Human Factors	3
ISE:3450	Ergonomics	3
ISE:4172	Big Data Analytics	3
ME:4080	Experimental Engineering	4
ME:4110/CEE:4515	Computer-Aided Engineering	3
ME:4111/CEE:4511	Scientific Computing and Machine Learning	3
ME:4112/CEE:4512	Engineering Design Optimization	3
ME:4117	Finite Element Analysis	3
ME:4140	Modern Robotics and Automation	3
ME:4150	Artificial Intelligence in Engineering	3
ME:4200	Modern Engineering Materials for Mechanical Design	3

The following courses may not be counted.

Course #	Title	Hours
Not from these:		
BME:5010	Seminar in Biomedical Engineering	1
BME:5999	Research: Biomedical Engineering MS Thesis	arr.
BME:7999	Research: Biomedical Engineering PhD Dissertation	arr.
CBE:5100	Graduate Professional Development Seminar	1
CBE:5998	Individual Investigations: Chemical and Biochemical Engineering	arr.
CEE:5099	Civil and Environmental Engineering Graduate Seminar	0
CEE:5998	Individual Investigations: Civil and Environmental Engineering	arr.
CEE:5999	Research: Civil and Environmental Engineering MS Thesis	arr.
CEE:7999	Research: Civil and Environmental Engineering PhD Dissertation	arr.
ECE:5000	Graduate Seminar: Electrical and Computer Engineering	0
ECE:5998	Individual Investigations: Electrical and Computer Engineering	arr.
ECE:5999	Research: Electrical and Computer Engineering MS Thesis	arr.
ECE:7999	Research: Electrical and Computer Engineering PhD Thesis	arr.
ISE:5000	Graduate Seminar: Industrial Engineering	1
ISE:5998	Individual Investigations: Industrial Engineering	arr.
ISE:5999	Research: Industrial Engineering MS Thesis	arr.
ISE:7998	Special Topics in Industrial Engineering	arr.
ISE:7999	Research: Industrial Engineering PhD Dissertation	arr.
ME:6191	Graduate Seminar: Mechanical Engineering	1
ME:6198	Individual Investigations: Mechanical Engineering	arr.
ME:6199	Research: Mechanical Engineering MS Thesis	arr.
ME:7299	Research: Mechanical Engineering PhD Dissertation	arr.

## Engineering Research or Elective Courses

Students in the program with thesis complete 6 s.h. of BME:5999 Research: Biomedical Engineering MS Thesis.

Students in the program without thesis complete 6 s.h. of elective courses selected from the preceding "Graded Engineering Courses" section; these courses must be taken on an A-F graded basis.

## Additional Requirements

All thesis students must successfully complete the final examination administered by their committee, which consists of a written thesis and an oral presentation and defense to the examining committee.

There is no oral or written exam required for completing the master's degree without thesis.