

# Biomedical Engineering, MS

Graduate study in biomedical engineering prepares students to use contemporary methods at an advanced level during a professional career in engineering design, development, and research.

Each student's course of study is based on individual background, career objectives, and sound academic practice. An individual program for each student may be developed from courses offered by the Roy J. Carver Department of Biomedical Engineering and other departments, especially mechanical engineering, electrical engineering, physiology, mathematics, and biological sciences. Students who want a more general program may combine emphases, while those who want some specialization in a particular field can achieve their goals through the combination of departmental courses and appropriate electives from other departments in the College of Engineering and the university.

## Learning Outcomes

By completing the graduate curriculum in biomedical engineering, students will be able to:

- demonstrate broad knowledge of the field of biomedical engineering and deep knowledge in their specific area of study;
- communicate complex technical ideas concisely and effectively to both general and specialized audiences through verbal, visual, and written formats;
- formulate research questions, pose testable hypotheses, employ methods that enhance the reproducibility of research, and apply critical thinking skills to produce solutions to complex engineering problems that intersect with biology and human health; and
- operate with professionalism and under standards of ethical conduct.

## Requirements

The Master of Science program in biomedical engineering requires a minimum of 30 s.h. of graduate credit, 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.

All MS students (thesis or nonthesis) must successfully complete the Graduate Core Courses as part of their graduate curriculum during their first year of study. Additionally, students are required to complete 18 s.h. of graduate-level coursework in the College of Engineering over the course of their studies. BSE/MS fast-track students may include courses taken during year four and/or year five.

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.

## Graduate Core Courses

Course #	Title	Hours
ENGR:7270	Engineering Ethics	1
HHP:3500	Human Physiology	3

ME:5113	Mathematical Methods in Engineering (or equivalent graduate mathematics course; approval of academic advisor required before registering)	3
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Depending upon a student's performance in Graduate Core Courses and the nature of their research project, the student's examining committee may specify additional coursework to be completed to satisfy the Graduate Core Courses requirement.

Graduate 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 Graduate Core Courses requirements. Students who wish to request a substitution or a waiver of HHP:3500 Human Physiology or ME:5113 Mathematical Methods in Engineering must submit a core course substitution or waiver form. Forms may be obtained from the graduate program coordinator.

## Thesis Students

Students who choose the thesis program may count no more than 6 s.h. of thesis research and writing credit toward the degree. 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.

## Nonthesis Students

Students who choose the nonthesis program must earn at least 6 s.h. of credit in courses numbered 5000 or above. There is no oral or written exam required for the nonthesis master's degree.

## Admission

Applicants must meet the admission requirements of the Graduate College; see the Manual of Rules and Regulations on the Graduate College website.

Applicants who have earned a baccalaureate or postbaccalaureate degree in engineering or in the mathematical or physical sciences with a grade-point average (GPA) of at least 3.00 are eligible to be considered for admission to the Master of Science program.

Reference letters, research interests, previous graduate GPA, and other factors may be considered in admission decisions.

## Career Advancement

Biomedical engineers with MS degrees can pursue career opportunities in the health care industry in the fields of biomedical devices, diagnostic equipment, and software. Graduates have started careers in research, design, development, sales, and entrepreneurship, and they advance to administrative and leadership positions in their organizations. Graduates also have careers with health care providers, such as in hospitals, or use their biomedical engineering expertise to advance careers in medicine and law. Faculty mentors assigned to graduate students aid in their professional development. Students are exposed to

opportunities through seminar speakers who have relevant expertise and are invited to campus.

The Graduate College offers numerous career advancement opportunities and professional development programs for graduate students. Ongoing program offerings, news, and announcements can be found under Grad Success Center on the Graduate College website.

## Academic Plans

### Sample Plan of Study

Sample plans represent one way to complete a program of study. Actual course selection and sequence will vary and should be discussed with an academic advisor. For additional sample plans, see MyUI.

### Biomedical Engineering, MS

Course	Title	Hours
<b>Academic Career</b>		
<b>Any Semester</b>		
30 s.h. must be graduate level coursework; graduate transfer credits allowed upon approval. More information is included in the General Catalog and on department website. <sup>a</sup>		
Graduate College program GPA of at least 2.75 is required. <sup>b</sup>		
<b>Hours</b>		<b>0</b>
<b>First Year</b>		
<b>Fall</b>		
BME:5010	Seminar in Biomedical Engineering	0
ENGR:7270	Engineering Ethics <sup>c</sup>	1
HHP:3500	Human Physiology <sup>d</sup>	3
ME:5113	Mathematical Methods in Engineering <sup>e</sup>	3
Other required course <sup>f</sup>		3
<b>Hours</b>		<b>10</b>
<b>Spring</b>		
BME:5010	Seminar in Biomedical Engineering	0
Other required course <sup>f</sup>		3
Other required course <sup>f</sup>		3
Other required course <sup>f</sup>		3
<b>Hours</b>		<b>9</b>
<b>Second Year</b>		
<b>Fall</b>		
BME:5010	Seminar in Biomedical Engineering	0
Other required course <sup>f</sup>		3
Other required course <sup>f</sup>		3
Other required course <sup>f</sup>		3
<b>Hours</b>		<b>9</b>
<b>Spring</b>		
BME:5010	Seminar in Biomedical Engineering	0
Other required course <sup>f</sup>		3
Final Exam <sup>g</sup>		
<b>Hours</b>		<b>3</b>
<b>Total Hours</b>		<b>31</b>

<sup>a</sup> Students must complete specific requirements in the University of Iowa Graduate College after program

admission. Refer to the Graduate College website and the Manual of Rules and Regulations for more information.

- <sup>b</sup> Graduate College program GPA is comprised of all courses that are approved degree requirements. If a student takes more than the minimum required number of semester hours to complete the degree, but all courses taken are eligible to count toward the degree, those courses will be included in the Graduate College program GPA.
- <sup>c</sup> All students must complete this course during first year fall semester; does not count toward the total hours required for the degree.
- <sup>d</sup> Course substitution or waiver allowed upon approval.
- <sup>e</sup> Or equivalent graduate level mathematics course; advisor approval required prior to registration.
- <sup>f</sup> 18 s.h. must be graduate coursework at the 5000 level or above from the College of Engineering or courses from the approved elective list; work with faculty advisor to determine appropriate graduate coursework and sequence.
- <sup>g</sup> Completion of all degree requirements.