Biomedical Engineering, M.S.

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 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 thesis. Students who choose the nonthesis program must earn at least 6 s.h. of credit in courses numbered 5000 or above. Those who choose the thesis program may count no more than 6 s.h. of thesis research and writing credit toward the degree. Students must maintain a cumulative g.p.a. of at least 2.75 in all work for the degree. The M.S. may be a terminal degree or a step toward the Ph.D.

A tentative plan of study for each student is determined through consultation with an advisor. An M.S. committee of at least three graduate faculty members, including at least two on the biomedical engineering faculty, is appointed by the dean of the Graduate College. A student’s plan of study is reviewed by the committee before the student has completed 18 s.h. of coursework. The plan of study then is submitted for review to the department chair. All students must successfully complete the final examination administered by their committee. All M.S. students (thesis or nonthesis) must successfully complete the Graduate Core Courses as part of their graduate curriculum. Students are expected to complete them 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. B.S.E./M.S. fast track students may include courses taken during year four and/or year five.

Graduate Core Courses

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<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>ENGR:7270</td>
<td>Engineering Ethics</td>
<td>1</td>
</tr>
<tr>
<td>HHP:3500</td>
<td>Human Physiology</td>
<td>3</td>
</tr>
<tr>
<td>ME:5113</td>
<td>Mathematical Methods in Engineering (or equivalent graduate mathematics course; approval of academic advisor required before registering)</td>
<td>3</td>
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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 M.S. 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 must submit a core course substitution or waiver form. Forms may be obtained from the graduate program coordinator.

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 g.p.a. of at least 3.00 are eligible to be considered for admission to the Master of Science program.

Reference letters, research interests, previous graduate grade-point average, and other factors may be considered in admission decisions.

Financial Support

Research assistant positions are available on a variety of research projects, and a limited number of teaching assistant positions may be available. Selection of recipients is usually based on scholastic achievement and research interest. These awards may be made on a semester, academic year, or calendar year basis. Awards and reappointments are competitive and are based on a student’s potential contribution to the teaching and research goals of the department. Students who fulfill their research assistant responsibilities and continue to make satisfactory progress toward their degree objective receive preference in new awards.

Career Advancement

Biomedical engineers with M.S. 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 advance to administrative and leadership positions in their organizations. Graduates also have careers with health care providers such as in hospitals, or used 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 that 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.