

THE FIELD

Biomedical engineering (BME) integrates engineering science, biology, and medicine into a cross-disciplinary field focused on improving human health and solving problems in health care delivery. Looking at the human body through the lens of engineering, one can apply the concepts of design, optimization, and programming to complex biological systems in order to detect, repair, and treat disease as well as to create diagnostic and therapeutic tools. Graduates of the biomedical engineering undergraduate degree program will be prepared for a broad range of careers, including medical equipment design and manufacturing, scientific research and development services, pharmaceutical and medicine manufacturing, and work with medical professionals.

There is no minor available in biomedical engineering.

THE MAJOR

The department offers a bachelor of science (BS) in biomedical engineering. Students have the option, but are not required, to focus their technical electives in these broad areas: biomechanics and medical devices; biomaterials and molecular therapeutics; and sensors and bioinstrumentation. All majors must also fulfill General Education and college requirements.

ADMISSION TO THE MAJOR

Admission to the major will be contingent upon completing first-year engineering with a cumulative and most recent semester GPA of 2.0 or higher, and a grade of C or better in a set of predictor courses that includes: MATH 131, MATH 132, ENGIN 114 (or 100, 110, 111, 112, or 113), PHYSICS 151, CHEM 111 or PHYSICS 152, CMPSCI 121 or ECE 122 or CMPSCI 121 (or department-approved equivalent), and ENGLWRIT 112.

CURRICULUM

Students take a core of science, math, and social world elective courses, as well as BME-specific courses. Required courses include (but are not limited to) Bioengineering, Statics and Dynamics, Introduction to Programming, Materials Science, Strength of Materials, Laboratory Techniques, Anatomy and Physiology, Biomechanics, Biomaterials, Bioinstrumentation, Statistics, Quantitative Physiology, Senior Design I & II, Systems Biology, and Writing in Engineering. During their junior and senior years students must take at least five technical elective courses. They have the option, but are not required, to focus their electives in one of three biomedical areas: biomechanics and medical devices; biomaterials and molecular therapeutics; and sensors and bioinstrumentation. Students may substitute at least one elective course with a research course, which can be taken at the sophomore, junior, or senior level.

COOPERATIVE EXPERIENCE

Internships in an industrial, hospital, or academic setting provide significant advantages to students in their education and in the opportunities available to them upon graduation. Students are encouraged to discuss opportunities with the college's career center as well as with their academic advisor.

HONORS

UMass Amherst honors (Commonwealth Honors College) and departmental honors programs provide engineering students with the opportunity to participate in an honors experience on campus, including honors courses, seminars, undergraduate research projects, and a senior research thesis. Students interested in participating in departmental honors and Commonwealth Honors College should contact the honors coordinator in their respective College of Engineering department.

STUDY ABROAD

Engineering students are encouraged to consider study abroad. These are typically semester-long experiences taking General Education courses, engineering courses, and other technical electives to fulfill engineering degree requirements. Prior departmental approval is required for engineering and technical elective courses. For more information, contact the International Programs Office (413-545-2710, umass.edu/ipo).

CAREER OPPORTUNITIES

Biomedical engineering graduates are prepared to enter careers in biomedical engineering and allied professions or go on to further study at graduate and professional schools. Jobs can be found in research facilities, regulatory agencies, hospitals or medical institutions, medical products-related companies, and manufacturing facilities. Graduates are expected to be able to apply knowledge of mathematics, science, and engineering; to identify, formulate, and solve engineering problems; to design and conduct experiments, design systems, components, or processes to meet needs; to work in teams, to communicate effectively, to conduct themselves professionally and ethically; and to understand the need for lifelong learning.

THE COLLEGE OF ENGINEERING

Modern society is faced with highly complex technological problems for which engineers are asked to provide solutions. These challenges make engineering a fascinating field of study and give prospective engineering students a wonderful opportunity to make a difference in society. Along with theoretical and practical knowledge, engineering students also gain experience by working in labs, collaborating with professors, joining research projects, participating in internships, working in the field, and completing a culminating senior project. In today's high-tech world, the engineering degree is a great foundation for careers in traditional engineering fields, as well as careers in management, sales, government, medicine, research, law, teaching, and more.

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