Biomedical Engineering, B.S.E.

Educational Objectives
The department provides undergraduate students with a contemporary education in a multidisciplinary field of engineering. Its objective is to produce graduates who:

• advance the biomedical field through the responsible analysis and design of devices, systems, processes, and policies that improve human health;
• pursue a wide range of career options, including those in industry, academia, and medicine; and
• collaborate on multidisciplinary teams and become leaders in their chosen field.

Requirements
The major in biomedical engineering builds on the foundation provided by the B.S.E. core requirements, preparing students for the challenges and opportunities associated with careers in the profession.

The program has been designed carefully to enable students to satisfy the entrance requirements of the Graduate College. Students whose choice of electives includes a three-course sequence in organic chemistry, an additional biology course, and a biochemistry course may satisfy entrance requirements of the Carver College of Medicine, the College of Dentistry, or the allied health sciences.

All engineering students complete the B.S.E. core requirements, for the Bachelor of Science in Engineering.

Biomedical engineering students must choose a track, which constitutes the elective focus area for the biomedical engineering major. They may choose one of four preapproved tracks—bioimaging, bioinformatics, biomechanics and biomaterials, and cellular engineering. Each track may be designated pre-medicine by taking the necessary track electives. Each approved track has a group of four required courses and a list of suggested electives. For details about tracks and their requirements, visit biomedical engineering Tracks on the department's website.

Combined Programs

B.S.E./M.S.

The College of Engineering offers a combined Bachelor of Science in Engineering/Master of Science for biomedical engineering undergraduate students who intend to earn a M.S. in biomedical engineering. Students admitted to this program are allowed to apply three engineering courses (9 s.h.) towards both the B.S.E. and M.S. degree requirements, take an additional 3 s.h. of graduate course work before completing their B.S.E., and attend and participate in the departmental graduate seminar. Students may begin to work on their course work or master's thesis starting as early as the summer following the junior year of undergraduate studies.

Students applying to the B.S.E./M.S. program in biomedical engineering must meet the following criteria at the time of application:

• a minimum of 80 s.h. completed towards their B.S.E. degree,
• a cumulative g.p.a. of 3.50 or higher, and
• identification of a thesis or project mentor.

B.S.E./M.S. in Electrical and Computer Engineering

B.S.E. students majoring in biomedical engineering who are interested in earning a Master of Science in electrical and computer engineering may apply to the combined B.S.E./M.S. program offered by the College of Engineering. The combined program permits students to count a limited amount of credit toward the requirements of both degrees. See the M.S. in electrical and computer engineering in the Catalog.

B.S.E.(Biomechanics and Biomaterials Track)/M.S. in Occupational and Environmental Health (Industrial Hygiene Subprogram)

B.S.E. students majoring in biomedical engineering in the biomechanics and biomaterials track who are interested in earning a Master of Science in occupational and environmental health with an industrial hygiene subprogram may apply to the combined B.S.E./M.S. program offered by the College of Engineering and the College of Public Health. The combined program permits students to count a limited amount of credit toward the requirements of both degrees, enabling them to begin the study of public health before they complete the bachelor's degree. See the M.S. in Industrial Hygiene—Undergrad to Grad information in the Department of Occupational and Environmental Health (College of Public Health) section of the Catalog.

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, B.S.E.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>First Year</td>
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<tr>
<td>Fall</td>
<td></td>
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<tr>
<td>MATH:1550</td>
<td>Engineering Mathematics I: Single Variable Calculus a</td>
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<tr>
<td>ENGR:1100</td>
<td>Introduction to Engineering Problem Solving</td>
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<tr>
<td>CHEM:1110</td>
<td>Principles of Chemistry I b</td>
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<tr>
<td>RHE:1030</td>
<td>Rhetoric</td>
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<td>Engineering Success for First-Year Students c</td>
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<td>CSI:1600</td>
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<tr>
<td></td>
<td>Hours</td>
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<tr>
<td>Spring</td>
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<tr>
<td>MATH:1560</td>
<td>Engineering Mathematics II: Multivariable Calculus</td>
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b
c
MATH:2550 Engineering Mathematics III: Matrix Algebra 2
ENGR:1300 Introduction to Engineering Computing 3
PHYS:1611 Introductory Physics I 4
CHEM:1120 Principles of Chemistry II 4
BME:1010 First-Year Forum 1

**Second Year**

**Fall**
MATH:2560 Engineering Mathematics IV: Differential Equations 3
BIOL:1411 Foundations of Biology 4
ENGR:2110 Engineering Fundamentals I: Statics 2
ENGR:2120 Engineering Fundamentals II: Electrical Circuits 3
ENGR:2130 Engineering Fundamentals III: Thermodynamics 3
BME:2010 Professional Seminar: Biomedical Engineering 1

**Spring**
HHP:3500 Human Physiology 3
BME:2200 Systems, Instrumentation, and Data Acquisition 4
BME:2210 Bioimaging and Bioinformatics 4
BME:2500 Biомaterials and Biомechanics 4
STAT:3510 Biostatistics or BIOS:4120 or Introduction to Biostatistics 3
BME:2010 Professional Seminar: Biomedical Engineering 1

**Third Year**

**Fall**
BME:2400 Cell Biology for Engineers 3
Track Requisite #1 3
PHYS:1612 Introductory Physics II 4
GE: Engineering Be Creative d 3
GE: CLAS General Education Component e 3
BME:3010 Leadership and Resourcefulness c 1

**Spring**
Track Requisite #2 3
Track Elective #1 f 3
Track Elective #2 f 3
GE: Approved Course Subjects g 3
GE: Approved Course Subjects g 3
BME:4010 Biomedical Engineering Design Seminar 1

**Fourth Year**

**Fall**
BME:4910 Biomedical Engineering Senior Design I 4
Track Requisite #3 3
Track Elective #3 h 3

**Track Elective #4**

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**Spring**

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<th>Course</th>
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**Track Elective #5**

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**Track Elective #6**

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**Track Elective #7**

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**GE: Approved Course Subjects**

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<th>Hours</th>
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<tr>
<td>BME:4920</td>
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**Degree Application**
Apply on MyUI before deadline (typically in February for spring, September for fall)

**Total Hours**
134

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**Career Advancement**

B.S.E. graduates with a major in biomedical engineering may pursue career opportunities in biomedical industries, such as design and development of biomedical instrumentation, diagnostic aids, life-support systems, prosthetic and orthotic devices, and man-machine systems; or they may pursue traditional career opportunities in industry, such as those rooted in mechanical or electrical engineering disciplines. Other career options are available in government (Food and Drug Administration, Environmental Protection Agency, National Institutes of Health, Veterans Affairs). Some biomedical engineering graduates elect to continue formal education in engineering, medicine, or law. On average, 93-98 percent of graduates are employed in their field of study or pursuing advanced education within seven months of graduation.

Engineering Professional Development (EPD) develops and promotes experiential education and professional opportunities for students in the College of Engineering. Professional staff coordinate the college's co-op and internship program, engage in employer outreach, and provide opportunities for students to network with employers, including an engineering career fair each semester and other programming related to career development.

EPD also offers individual advising and class presentations on résumé and cover letter preparation, job and internship search strategies, interviewing skills, and job offer evaluation.