BIOMEDICAL ENGINEERING
(B.S.)

Wayne State's undergraduate program in biomedical engineering is built upon a strong foundation of engineering that integrates biomedical sciences early in the curriculum and continuously throughout subsequent coursework. In order to prepare students for careers and/or further education, traditional lectures are combined with problem-based and project-based learning to allow students to immediately apply their foundational knowledge to biomedical engineering challenges. From the first week of the program, through an ongoing partnership with the Medical School and affiliated hospitals, students are introduced to real-world biomedical engineering problems and tools so as to develop a thorough understanding of the challenges faced in clinical medicine. All students are also encouraged to become actively involved in one of the research groups of the Department for which opportunities are available as early as freshman year. Before the junior year all biomedical engineering students must select one of three concentrations: biomaterials, biomechanics, or bio-medical instrumentation.

The program’s objectives are to prepare graduates who, in two-three years after graduation, will be able to:

1. Work in multidisciplinary teams to translate biomedical science to application;
2. Utilize engineering, mathematical, and biomedical tools to solve biomedical engineering problems and design biomedical engineering systems;
3. Continue their education in engineering or biomedical fields based on a strong underlying foundation in both areas of study.

The B.S.B.M.E. program is coordinated by the Undergraduate Program Chairperson with the assistance of the Departmental academic advisor. These individuals are available to support students in selecting courses, identifying research and internship opportunities, and discussing plans for after graduation. Students are encouraged to join and actively participate in the campus chapter of the Biomedical Engineering Society (BMES) for networking and professional development opportunities.

Admission Requirements

Students qualifying for admission to the College of Engineering must select the B.S.B.M.E. program in the online application. The applicant must provide supporting documentation as instructed. Due to the challenging nature of biomedical engineering, the undergraduate program is highly selective and admits students who have a demonstrated ability in math and science. In addition, the program is structured as a cohort-based program. Therefore, admission by transfer students requires completion of a minimum set of prerequisite courses. First year students are accepted for the fall semester only. Students wishing to join the program in the second year are accepted for the spring/summer semester in order to complete some required coursework before joining their cohort in the fall.

Freshman Admission: Students wishing to enter the program immediately following high school must have a minimum math/science g.p.a. of 3.5 and a minimum Math ACT score of 29. Students who have completed college-level coursework through dual enrollment programs will still be considered as freshmen. For full consideration for fall admission, including all scholarship opportunities, students should apply to the University and the Biomedical Engineering Program by December 1. Following admission, students must confirm placement into at least Calculus I (MAT 2010) and General Chemistry + lab (CHM 1225+CHM 1230) through either testing (ACT/SAT, AP, Placement Exams) or transfer credit. Admitted students who do not meet these criteria will have their admission deferred.

Transfer Admission: Students may apply to transfer into the program after completing college-level coursework at Wayne State or at another post-secondary institution. Transfer students may apply to join the program as part of a first year or second year cohort depending on the coursework that they have previously completed. The following are the minimum classes that must be completed for transfer students to join each cohort:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>MAT 2010</td>
<td>Calculus I and Calculus II</td>
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<tr>
<td>CHM 1225</td>
<td>General Chemistry (with lab)</td>
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</tr>
<tr>
<td>BE 1500</td>
<td>Biomedical Engineering (B.S.)</td>
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Transfer students are accepted on a space-available basis. Prospective students are expected to have earned a minimum math/science g.p.a. of 3.33 in their college coursework.

Candidates for the Bachelor of Science degree must complete 130 credits of coursework, including the University General Education (http://bulletins.wayne.edu/undergraduate/general-information/general-education) requirements. Forty-eight credits of coursework must be in engineering sciences or engineering design. Most courses offered by other engineering departments count toward this forty-eight engineering credit requirement. Note: BME 2010, BME 2070, BME 4010, and BME 5070 count as life science courses and not engineering courses. All course work must be completed in accordance with the academic procedures of the University (http://bulletins.wayne.edu/undergraduate/general-information) and the College of Engineering (http://bulletins.wayne.edu/undergraduate/engineering/academic-regulations) governing undergraduate scholarship and degrees. All prerequisite coursework must be completed; any waivers to listed prerequisite courses must be approved by the Undergraduate Program Chairperson. In compliance with the academic requirements of the College of Engineering, students must earn a grade of C- or higher in all courses applied to the B.S.B.M.E. degree requirements. The 8-semester curriculum for the program is provided below. Students interested in attending medical or dental school after graduation may add any remaining pre-professional requirements into their curriculum with minimal difficulty.

Biomedical Engineering Curriculum

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<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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<tr>
<td>First Year</td>
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<tr>
<td>First Semester</td>
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<tr>
<td>BE 1500</td>
<td>Introduction to Programming and Computation for Engineers</td>
<td>3</td>
</tr>
<tr>
<td>BME 1910</td>
<td>Biomedical Engineering Design Lab</td>
<td>1</td>
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Biomedical Engineering (B.S.) 1
CHM 1225  General Chemistry I for Engineers  3

CHM 1230  General Chemistry I Laboratory  1

ENG 1020  Introductory College Writing  3

MAT 2010  Calculus I  4

Credits  15

Second Semester

BE 1300  Basic Engineering II: Materials Science for Engineering Applications  3

BE 2100  Basic Engineering III: Probability and Statistics in Engineering  3

BIO 1510  Basic Life Mechanisms  4

BME 1920  Biomedical Engineering Design Lab II  1

MAT 2020  Calculus II  4

PHY 2175  University Physics for Engineers I  4

Credits  19

Second Year

First Semester

BME 2070  Introduction to Anatomy for Engineers  2

BME 2910  Biomedical Engineering Design Lab III  1

CHM 1240  Organic Chemistry I  4

MAT 2030  Calculus III  4

ME 2410  Statics  3

PHY 2185  University Physics for Engineers II  4

Credits  18

Second Semester

BME 2010  Introduction to Physiology for Engineers  2

BME 2920  Biomedical Engineering Design Lab IV  1

ECE 3300  Introduction to Electrical Circuits  4

ENG 3050  Technical Communication I: Reports  3

MAT 2150  Differential Equations and Matrix Algebra  4

ME 2420  Elementary Mechanics of Materials  3

Credits  17

Third Year

First Semester

BME 3470  Biomedical Signals and Systems  3

BME 3910  Biomedical Engineering Design Lab V  1

CHE 3200  Fluid Flow and Heat Transfer  4

Directed elective  4

ENG 3060  Technical Communication II: Presentations  3

General Education Course  3

Credits  18

Second Semester

BME 3920  Biomedical Engineering Design Lab VI  2

BME 4010  Engineering Physiology Laboratory  1

BME 4X10  Biomedical Engineering Elective Course(4-6000 level)  3

BME Elective Course  4

General Education Course  3

Credits  13

Fourth Year

First Semester

BME 4910  Biomedical Engineering Capstone Design I  3

BME Concentration Electives  8

General Education Course  3

Credits  14

Second Semester

BME 4920  Biomedical Engineering Capstone Design II  3

BME Concentration Elective  4

General Education Courses  9

Credits  9

Total Credits  130

Honors and Accelerated Master's AGRADE Program

All students in the B.S.B.M.E. program are encouraged to pursue their degree with Engineering and/or University Honors. Students can complete their requirements for Honors within the 130 credits required for the program. The required Honors thesis will satisfy the requirement for one of the concentration electives.

Students who have earned at least a 3.5 g.p.a. through their junior year may apply to the AGRADE Program. Through this program, students may
earn their M.S. in biomedical engineering with one additional year of coursework (18 credits).