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. 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 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, within a few years of graduation, will be able to

1. Work in multidisciplinary teams to translate biomedical science into applications that will improve people's quality of life

2. Utilize and advance engineering, mathematical, and biomedical tools to solve biomedical engineering problems and design biomedical engineering systems

3. Continue the practice of lifelong learning in engineering and/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 for transfer students requires completion of a minimum set of prerequisite courses. They must complete all of the first-year coursework to join the second-year program. Students are only able to join the second-year program as transfer students regardless of transfer credits.

Freshman Admission

Students wishing to enter the program immediately following high school are expected to have a minimum high school g.p.a. of 3.2 and a minimum Math ACT/SAT score of 23/620. Students who have completed college-level coursework through dual enrollment programs will still be considered 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 Calculus I (MAT 2010) and General Chemistry + lab (CHM 1125 and CHM 1130) through either testing (ACT/SAT, AP, Placement Exams) or transfer credit. Admitted students who do not meet these criteria will be admitted as Pre BME.

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. Students wishing to join the program in the second year are required to complete the program's first-year coursework. The following classes should be completed, or in progress, for transfer students to be considered to join each cohort:

Code	Title	Credits
First Year Cohort		
Placement into Calculus I, General Chemistry (with lab), and Basic Composition		
Second Year Cohort		
Mathematics: Calculus I and Calculus II		
English: Basic Composition		
The following Basic Engineering coursework		
BE 1200	Basic Engineering I: Design in Engineering	3
BE 1300	Basic Engineering II: Materials Science for Engineering Applications	3
BE 1310	Materials Science for Engineering: Laboratory	1
BE 1500	Introduction to Programming and Computation for Engineers	3

Applicants without all of the expected placement or coursework will be required to complete the missing items during the spring/summer term. Transfer students are accepted on a space-available basis. Prospective students are expected to have earned a minimum math/science g.p.a. of 3.2 in their college coursework.

Candidates for the Bachelor of Science degree must complete 121 credits of coursework, including the University General Education (http://bulletins.wayne.edu/undergraduate/general-information/general-education/) requirements. A maximum of 35 credits shall comprise the General Education Program. Forty-five 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 2050, BME 4010, and BME 5070 count as life science courses and not engineering courses. All coursework 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/college-engineering/academic-regulations/) governing undergraduate scholarships 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

First Year		
First Semester		**Credits**
BE 1200	Basic Engineering I: Design in Engineering (Biomedical and Chemical)	3

CHM 1125	General Chemistry I for Engineers	3
CHM 1130	General Chemistry I Laboratory	1
ENG 1020	Introductory College Writing	3
MAT 2010	Calculus I	4
BME 1900	Biomedical Engineering Freshmen Seminar	1
	Credits	**15**
Second Semester		
BE 1300	Basic Engineering II: Materials Science for Engineering Applications	3
BE 1310	Materials Science for Engineering: Laboratory	1
BE 1500	Introduction to Programming and Computation for Engineers	3
MAT 2020	Calculus II	4
PHY 2170	University Physics I for Scientists and Engineers	4
	Credits	**15**
Second Year		
First Semester		
BE 2100	Basic Engineering III: Probability and Statistics in Engineering	3
BIO 1510 & BIO 1511	Basic Life Mechanisms and Basic Life Mechanisms Laboratory	4
BME 2910	Biomedical Engineering Design Lab I	1
MAT 2030	Calculus III	4
ME 2410	Statics	3
	Credits	**15**
Second Semester		
BME 2050	Introduction to Anatomy and Physiology for Biomedical Engineers	4
BME 2920	Biomedical Engineering Design Lab II	1
MAT 2150	Differential Equations and Matrix Algebra	4
ME 2420	Elementary Mechanics of Materials	3
PHY 2180	University Physics II for Scientists and Engineers	4
	Credits	**16**
Third Year		
First Semester		
BME 3470	Biomedical Signals and Systems	3
BME 3910	Biomedical Engineering Design Lab III	1
BME 3010	Biomedical Transport	3
ENG 3050	Technical Communication I: Reports	3
ECE 3300	Introduction to Electrical Circuits	4
General Education Course		3
	Credits	**17**
Second Semester		
BME 3920	Biomedical Engineering Design Lab IV	2
BME 4010	Engineering Physiology Laboratory	2
BME 4X10- First Course in Concentration Elective		3
ENG 3060	Technical Communication II: Presentations	3
General Education Course		3
	Credits	**13**
Fourth Year		
First Semester		
BME 4910	Biomedical Engineering Capstone Design I	3
Concentration Electives		8
General Education Course		3
	Credits	**14**
Second Semester		
BME 4920	Biomedical Engineering Capstone Design II	3
BME 4X10—Second course in Concentration Elective		3
Concentration Elective		4
General Education Courses		6
	Credits	**16**
	Total Credits	**121**

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 125 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 3.45 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).