

# BIOMEDICAL ENGINEERING BACHELOR OF SCIENCE

## Leading to a Bachelor of Science Degree in Biomedical Engineering

The Bachelor of Science in Biomedical Engineering program is accredited by the Engineering Accreditation Commission of ABET (<http://www.abet.org>).

### Program Description

The Biomedical Engineering program focuses on designing, building, and supporting biomedical instrumentation, devices, and systems that provide solutions at the intersection of biology and medicine. The program leverages the proximity and strength of the nearby medical community to allow students to engage in valuable learning experiences and prepare them for rewarding careers in healthcare-related industries, hospitals, academic and government research laboratories, regulatory agencies, and service agencies. It will also prepare students who may want to pursue advanced studies in graduate education in Biomedical Engineering and professional programs such as medicine, dentistry, law, and business. Students will learn and build skills and expertise in electronics, signals and systems, instrumentation, biomechanics, biomaterials, and biostatistics, and collaboratively carry out interdisciplinary Biomedical Engineering capstone projects.

Students will have a choice to select from an array of Biomedical Engineering courses, including Medical Devices and Systems, Medical Imaging and Optics, Medical Informatics and Telemedicine, Clinical Engineering Practice, Design of Prosthetics and Implants, Medical Robotics and Assistive Technologies, and Artificial Intelligence and Analytics in Healthcare. The program is designed with an emphasis on Medical Devices and Systems.

### Program Educational Objectives

Graduates of the biomedical engineering program will (within a few years of graduation):

- Advance in their careers or pursue higher education in biomedical engineering or a related field.
- Apply the acquired comprehensive knowledge and engage in lifelong learning opportunities to meet the needs of the profession.
- Contribute responsibly and ethically towards impacting the biomedical engineering profession and improving human health.

### Student Outcomes

Students from the biomedical engineering program will attain (by the time of graduation):

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. An ability to communicate effectively with a range of audiences.
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must

consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Total credits for degree: 128

This is a four-year program, starting in the fall of the student's first year and ending in the summer semester of the student's fourth year.

After taking the prerequisite courses in math, physics, chemistry, biology, anatomy and physiology, and basic organic and biochemistry, as well as in basic electrical and mechanical engineering, the students in the Biomedical Engineering major are required to take the core courses, namely, Biomedical Electronics and Instrumentation, Signals and Systems for Biomedical Engineering, Biomechanics, Biomaterials & Tissue Engineering, Biostatistics, Engineering in Biomedicine, and BME Senior Design I & II. Three Biomedical Engineering elective courses are required for this program. The Biomedical Engineering electives include courses such as: Medical Devices and Systems, Medical Imaging and Optics, Medical Informatics and Telemedicine, Artificial Intelligence & Analytics in Healthcare and Medical Robotics & Assistive Technologies. In addition, students may choose a suitable engineering elective course either within or outside of the Biomedical Engineering discipline for their Engineering Elective. It is recommended that students discuss with their faculty advisor prior to registering for courses.

Course	Title	Credits
<b>Freshman Year</b>		
<b>Fall Semester</b>		
ENGR1100	INTRODUCTION TO ENGINEERING EXPERIENCE	2
ENGR1202	ENGINEERING LABORATORY-BBME	2
MATH1776	CALCULUS 1A	2
MATH1777	CALCULUS 1B	2
BIOL1100	CELL & MOLECULAR BIOLOGY	4
English Sequence*		4
		<b>Credits</b>
		<b>16</b>
<b>Spring Semester</b>		
ENGR1300	FIRST-YEAR ENGINEERING DESIGN	2
ENGR1402	APPLIED ENGINEERING ANALYSIS-BBME	2
MATH1876	CALCULUS 2A	2
MATH1877	CALCULUS 2B	2
PHYS1250	ENGINEERING PHYSICS I	4
English Sequence*		4
		<b>Credits</b>
		<b>16</b>
<b>Sophomore Year</b>		
<b>Fall Semester</b>		
BIOL1700	ANATOMY & PHYSIOLOGY I	4
CHEM1100	GENERAL CHEMISTRY I	4
ELEC2299	ELECTRICAL CIRCUIT ANALYSIS & DESIGN	4

Course	Title	Credits
PHYS1750	ENGINEERING PHYSICS II	4
<b>Credits</b>		<b>16</b>
<b>Spring Semester</b>		
BIOL1750	ANATOMY & PHYSIOLOGY II	4
BMED2500	BIOMEDICAL ELECTRONICS & INSTRUMENTATION	4
ELEC2699	INTEGRATED ELECTRONICS	3
MATH2025	MULTIVARIABLE CALCULUS	4
<b>Credits</b>		<b>15</b>
<b>Summer Semester</b>		
COOP3000	PRE CO-OP WORK TERM (OPTIONAL)	0
<b>Credits</b>		<b>0</b>
<b>Junior Year</b>		
<b>Fall Semester</b>		
COMP1000	COMPUTER SCIENCE I	4
MATH2750	DIFFERENTIAL EQUATIONS & SYSTEMS MODELING	4
Biomedical Engineering Elective		4
HSS Elective*		4
<b>Credits</b>		<b>16</b>
<b>Spring Semester</b>		
COOP3500	COOP EDUCATION 1	0
<b>Credits</b>		<b>0</b>
<b>Summer Semester</b>		
CHEM2000	BASICS OF ORGANIC & BIOCHEMISTRY	4
MECH3599	ENGINEERING MECHANICS	4
Biomedical Engineering Elective		4
Engineering Elective		4
<b>Credits</b>		<b>16</b>
<b>Senior Year</b>		
<b>Fall Semester</b>		
COOP4500	COOP EDUCATION 2	0
<b>Credits</b>		<b>0</b>
<b>Spring Semester</b>		
BMED4200	BIOMATERIALS & TISSUE ENGINEERING	3
BMED4300	SIGNALS AND SYSTEMS FOR BIOMEDICAL ENGINEERING	3
BMED4400	BIOMECHANICS	4
BMED5000	BIOMEDICAL ENGINEERING SENIOR DESIGN I	3
Biomedical Engineering Elective		4
<b>Credits</b>		<b>17</b>
<b>Summer Semester</b>		
BMED4500	ENGINEERING IN BIOMEDICINE	1
BMED4600	BIostatISTICS	4
BMED5500	BIOMEDICAL ENGINEERING SENIOR DESIGN II	3
HSS Elective*		4
HSS Elective*		4
<b>Credits</b>		<b>16</b>
<b>Total Credits</b>		<b>128</b>

**ENGL/HSS Note**

Students are required to complete:

- At least one course in Humanities: CSAS, HSSI, HIST, HUMN, LITR and PHIL
- At least one course in the Social Sciences: CSAS, HSSI, COMM, ECON, ENVM, POLS, PSYC and SOCL
- The remaining course from either the Humanities or Social Sciences category.

Students with a three English course sequence may use the third English course to satisfy a Humanities requirement.

A minimum of 20 credits total, including English, humanities, and social science credit, is required to complete the humanities and social sciences graduation requirement.

Math Placement (<https://catalog.wit.edu/academic-policies-procedures/ug/math-placement/>) may alter the course schedule above.