

# BIOMEDICAL ENGINEERING, B.S. (B.S.B.M.E.)

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The Biomedical Engineering discipline is the application of engineering principles and design concepts to medicine and biology for health care purposes. This discipline aims to narrow the gap between engineering and medicine, combining the design and problem-solving skills of engineering with medical and biosciences to advance health care treatment, including diagnosis, monitoring, and therapy. Biomedical engineering has only recently emerged as its own study, compared to many other engineering fields. Biomedical engineering is a rapidly growing field, and Marshall University has a unique program that will highlight the technical strengths of the university and garner interest in the development of the biomedical industry in the state.

The Marshall University Bachelor of Science in Biomedical Engineering (B.S.B.M.E.) program objectives are as follows:

1. Graduates demonstrate technical and/or professional skills, which may include engineering problem-solving, scientific inquiry, and/or engineering design, to solve challenging problems in biomedical engineering and related fields.
2. Graduates are accomplished at communicating and working collaboratively in diverse work environments.
3. Graduates engaging in life-long learning activities at graduate, medical or other professional programs or workshops. Graduates entering professional careers find appropriate career progression and success.

The student learning outcomes of the B.S.B.M.E. are as follows:

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.

## Admission Requirements


- Meet Marshall University admission requirements
- Admission to the B.S.B.M.E. program requires a minimum composite ACT score of 21 with a math score of 24, or a minimum SAT composite of 750 with a math SAT of 580.
- Transfer students must have completed MTH 127 College Algebra-Expanded/MTH 130 College Algebra and MTH 132 Precalculus with Sci Applica.

Students not meeting the ACT/SAT score requirements above may enroll in Pre-Engineering. Requirements for Pre-Engineering are a minimum composite ACT score of 19 with a math score of 19-23, or a minimum SAT composite of 700 with a math SAT of 500-560. Students who are admitted to the Pre-Engineering program generally will require an additional calendar year to complete the requirements for the B.S.B.M.E. degree. Transfer students must be eligible to take MTH 127 College Algebra-Expanded/MTH 130 College Algebra, and MTH 132 Precalculus with Sci Applica.

## Graduation Requirements







The B.S.B.M.E. degree program requires a minimum of 136 credit hours of coursework. In addition to fulfilling the university's requirements for graduation, B.S.B.M.E. students must maintain a minimum GPA of 2.0 in all professional courses. These professional courses include mathematics (MTH 229 Calculus/Analytic Geom I (CT) or above), required science courses, core engineering (ENGR) courses, biomedical engineering courses (BME), and courses used as technical electives. Entering students with a Math ACT of 24-26 are required to take MTH 132 Precalculus with Sci Applica. Such students will likely need an extra semester or summer term to satisfy B.S.B.M.E. requirements.























 - General Education Course

 - Milestone course: a key success marker for your major. See your advisor to discuss the importance of this course in your plan of study.

## Major


The Core Curriculum is designed to foster critical thinking skills and introduce students to basic domains of thinking that transcend disciplines. The Core applies to all majors. Information on specific classes in the Core can be found at <https://www.marshall.edu/gened/>.


Code	Title	Credit Hours
<b>Core Curriculum</b>		
<i>Core 1: Critical Thinking</i>		
FYS 100	First Yr Sem Critical Thinking	3
MTH 229 	Calculus/Analytic Geom I (CT)	5
	Critical Thinking Course	3
<i>Core 2</i>		
ENG 101 	Beginning Composition	3
ENG 201 	Advanced Composition	3
CMM 103 	Fund Speech-Communication	3
MTH 229 	Calculus/Analytic Geom I (CT)	5
BSC 120 	Principles of Biology	4
	Core II Humanities	3
	Core II Social Science	3

Core II Fine Arts	3
<i>Additional University Requirements</i>	
Writing Intensive	3
Writing Intensive	3
Multicultural or International	3
BME 465 	Biomedical Engr Capstone I 2
BME 466 	Biomedical Engr Capstone II 2
<b>Major-Specific</b>	
MTH 229 	Calculus/Analytic Geom I (CT) 5
MTH 230 	Calculus/Analytic Geom II 4
MTH 231 	Calculus/Analytic Geom III 4
MTH 335  	Ordinary Diff Equations 3
BSC 120 	Principles of Biology 4
BSC 121 	Principles of Biology 4
BSC 227	Human Anatomy 4
BSC 228 	Human Physiology 4
CHM 211  	Principles of Chemistry I 3
CHM 217 	Principles of Chem Lab I 2
CHM 212  	Principles Chemistry II 3
CHM 218 	Principles of Chem Lab II 2
PHY 211 	University Physics I 4
PHY 213 	University Physics II 4
ENGR 102	Introduction to CAD 2
ENGR 104	The Engineering Profession 1
ENGR 111	Engineering Computations 3
EE 202	Circuits II 3
or BSC 322	Principles Cell Biology
ENGR 213 	Statics 3
ENGR 214 	Dynamics 3
ENGR 216	Mech of Deformable Bodies 3
ENGR 219	Engineering Thermodynamics 3
or CHM 355	Organic Chemistry I
ENGR 245	Circuits and Instrumentation 3
ENGR 318	Fluid Mechanics 3
EE 202	Circuits II 3
BME 101	Intro to Biomedical Engr 1
BME 201	Biomedical Engineering Seminar 2
BME 302	Engineering Biomechanics 3
BME 305	Intro to Biophysical Measmnt 3
BME 306	Mechanics of Biological Tissue 3
BME 310	Modeling & Simulation Bio Syst 3
BME 405	Mech & Performance Bio Mtrls 3
BME 460	Mechanics of Biofuils 3
BME 465 	Biomedical Engr Capstone I 2
BME 466 	Biomedical Engr Capstone II 2
<i>BME Technical Electives</i>	
Select four 300- or 400-level biomedical engineering or closely related courses. The courses must be approved by the student's advisor and the department chair.	12

## Major Information














- Students are required to know and track their degree requirements for graduation or for entrance to a professional school.
- The B.S.B.M.E. degree program requires a minimum of 136 credit hours of coursework.
- Course offerings and course attributes are subject to change each semester. Please consult each semester's schedule of courses for availability and attributes.













 - General Education Course

 - Milestone course: a key success marker for your major. See your advisor to discuss the importance of this course in your plan of study.

## Four Year Plan

The Biomedical Engineering discipline is the application of engineering principles and design concepts to medicine and biology for health care purposes. This discipline aims to narrow the gap between engineering and medicine, combining the design and problem-solving skills of engineering with medical and biosciences to advance health care treatment, including diagnosis, monitoring, and therapy. Biomedical engineering has only recently emerged as its own study, compared to many other engineering fields. Biomedical engineering is a rapidly growing field, and Marshall University has a unique program that will highlight the technical strengths of the university and garner interest in the development of the biomedical industry in the state.

Course	Title	Credit Hours
<b>First Year</b>		
<b>First Semester</b>		
ENG 101 	Beginning Composition	3
MTH 229  	Calculus/Analytic Geom I (CT)	5
FYS 100	First Yr Sem Critical Thinking	3
ENGR 104	The Engineering Profession	1
BME 101	Intro to Biomedical Engr	1
CHM 211  	Principles of Chemistry I	3
CHM 217 	Principles of Chem Lab I	2
UNI 100	Freshman First Class	1
Credit Hours		19
<b>Second Semester</b>		
MTH 230 	Calculus/Analytic Geom II	4
CHM 212  	Principles Chemistry II	3
CHM 218 	Principles of Chem Lab II	2
ENGR 111	Engineering Computations	3
BSC 120 	Principles of Biology	4
ENGR 102	Introduction to CAD	2
Credit Hours		18
<b>Second Year</b>		
<b>First Semester</b>		
MTH 231 	Calculus/Analytic Geom III	4
BSC 227	Human Anatomy	4
BME 201	Biomedical Engineering Seminar	2
PHY 211 	University Physics I	4

ENGR 213 	Statics	3
	Credit Hours	17
<b>Second Semester</b>		
PHY 213 	University Physics II	4
BSC 121 	Principles of Biology	4
ENGR 214 	Dynamics	3
ENGR 216	Mech of Deformable Bodies	3
BSC 228 	Human Physiology	4
	Credit Hours	18
<b>Third Year</b>		
<b>First Semester</b>		
MTH 335  	Ordinary Diff Equations	3
BME 305	Intro to Biophysical Measmnt	3
CMM 103 	Fund Speech-Communication	3
BME 302	Engineering Biomechanics	3
ENGR 245	Circuits and Instrumentation	3
ENGR 219 or CHM 355	Engineering Thermodynamics or Organic Chemistry I	3
	Credit Hours	18
<b>Second Semester</b>		
ENGR 318	Fluid Mechanics	3
ENG 201  	Advanced Composition	3
BME 310	Modeling & Simulation Bio Syst	3
BME 306	Mechanics of Biological Tissue	3
Core II Social Science (MC/I, WI)		3
EE 202 or BSC 322	Circuits II or Principles Cell Biology	4
	Credit Hours	19
<b>Fourth Year</b>		
<b>First Semester</b>		
BME 405	Mech & Performance Bio Mtrls	3
BME Technical Elective		3
BME Technical Elective		3
BME 465 	Biomedical Engr Capstone I	2
BME 460	Mechanics of Biofuils	3
	Credit Hours	14
<b>Second Semester</b>		
BME Technical Elective		3
BME Technical Elective		3
BME 466 	Biomedical Engr Capstone II	2
Core II Humanities (WI, CT)		3
Core II Fine Arts		3
	Credit Hours	14
	Total Credit Hours	137