

# BIOMEDICAL ENGINEERING, B.A.

## Learning Outcomes

1. Ability to understand and apply basic science and perform technical skills to solve problems related to health and healthcare.
2. Ability to communicate effectively with a range of audiences.
3. Ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
4. 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.
5. Ability to recognize ethical and professional responsibilities in healthcare, and understand societal and global impact of biomedical engineering solutions.

## Academic Standards Program GPA

Program GPA requirement policies are described in the College of Engineering and Computing section of this bulletin. For the purpose of these policies, the following courses are used to determine the Program GPA for the Biomedical Engineering B.S. program: all Biomedical Engineering Major courses and all courses used to satisfy Biomedical Engineering Electives.

## Entrance Requirements

Admission requirements for freshman are established by the Office of Undergraduate Admissions ([http://sc.edu/about/offices\\_and\\_divisions/undergraduate\\_admissions/](http://sc.edu/about/offices_and_divisions/undergraduate_admissions/)). Admissions requirements for transfer, major change and readmitted students are established by the College of Engineering and Computing. For the BA Biomedical Engineering program, transfer applicants from regionally accredited colleges and universities must have a cumulative 2.75 GPA on a 4.00 scale. Current University of South Carolina students who wish to enter the College of Engineering and Computing, and former students seeking readmission, must have an institutional GPA of 2.50 or better on at least 15 hours earned at USC.

## Degree Requirements (120-126)

See College of Engineering and Computing (<https://academicbulletins.sc.edu/undergraduate/engineering-computing/>) for progression requirements and special academic opportunities.

### Program of Study

Requirements	Credit Hours
Carolina Core Requirements	32-42
College Requirements	0
Program Requirements	46-52
Major Requirements	36-38

### Founding Documents Requirement

All undergraduate students must take a 3-credit course or its equivalent with a passing grade in the subject areas of History, Political Science, or African American Studies that covers the founding documents including the United State Constitution, the Declaration of Independence,

the Emancipation Proclamation and one or more documents that are foundational to the African American Freedom struggle, and a minimum of five essays from the Federalist papers. This course may count as a requirement in any part of the program of study including the Carolina Core, the major, minor or cognate, or as a general elective. Courses that meet this requirement are listed here (<https://academicbulletins.sc.edu/undergraduate/founding-document-courses/>).

## 1. Carolina Core Requirements (32-42 hours)

### CMW – Effective, Engaged, and Persuasive Communication: Written (6 hours)

- ENGL 101 (<https://academicbulletins.sc.edu/search/?P=ENGL%20101>) *must be passed with a grade of C or higher*
- ENGL 102 (<https://academicbulletins.sc.edu/search/?P=ENGL%20102>)

### ARP – Analytical Reasoning and Problem Solving (6-7 hours)

*must be passed with a grade of C or higher*

- MATH 122 or MATH 141
- STAT 201 or STAT 205 or STAT 206

### SCI – Scientific Literacy (8 hours)

*must be passed with a grade of C or higher*

- BIOL 101 (<https://academicbulletins.sc.edu/search/?P=BIOL%20101>)
- BIOL 101L (<https://academicbulletins.sc.edu/search/?P=BIOL%20101L>)
- CHEM 111 (<https://academicbulletins.sc.edu/search/?P=CHEM%20111>)
- CHEM 111L (<https://academicbulletins.sc.edu/search/?P=CHEM%20111L>)

### GFL – Global Citizenship and Multicultural Understanding: Foreign Language (0-6 hours)

Score two or better on foreign language placement test; or complete the 109 and 110 courses in FREN, GERM, LATN or SPAN; or complete the 121 course in another foreign language.

- CC-GFL courses (<https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/>)

### GHS – Global Citizenship and Multicultural Understanding: Historical Thinking (3 hours)

- any CC-GHS course (<https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/>)

### GSS – Global Citizenship and Multicultural Understanding: Social Sciences (3 hours)

- any CC-GSS course (<https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/>)

## AIU – Aesthetic and Interpretive Understanding (3 hours)

- any CC-AIU course (<https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/>)

## CMS – Effective, Engaged, and Persuasive Communication: Spoken Component <sup>1</sup> (0-3 hours)

- any overlay or stand-alone CC-CMS course (<https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/>)

## INF – Information Literacy <sup>1</sup> (0-3 hours)

- ENGL 102

## VSR – Values, Ethics, and Social Responsibility <sup>1</sup> (0-3 hours)

- any overlay or stand-alone CC-VSR course (<https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/>)

<sup>1</sup> **Carolina Core Stand Alone or Overlay Eligible Requirements** – Overlay-approved courses offer students the option of meeting two Carolina Core components in a single course. A maximum of two overlays is allowed. The total Carolina Core credit hours for this program must add up to a minimum of 34 hours.

## 2. College Requirements (0 hours)

*No college-required courses for this program.*

## 3. Program Requirements (46-52 hours)

### Supporting Courses (46 hours)

#### Foundational Courses (19 hours)

Complete the following:

Course	Title	Credits
BIOL 102	Biological Principles II	3
BIOL 102L	Biological Principles II Laboratory	1
PHYS 201	General Physics I	3
PHYS 201L	General Physics Laboratory I	1
CHEM 112	General Chemistry II	3
CHEM 112L	General Chemistry II Lab	1
CHEM 333	Organic Chemistry I	3
CHEM 331L	Essentials of Organic Chemistry Laboratory I	1
or CHEM 333L	Comprehensive Organic Chemistry Laboratory I	
CSCE 106	Scientific Applications Programming (Scientific Applications Programming)	3
<b>Total Credit Hours</b>		<b>19</b>

#### Specialty Courses (27 hours)

Students must take 27 credit hours of specialty electives. Undergraduate courses that may be used to satisfy this requirement are listed below.

Course	Title	Credits
ACCT 222	Survey of Accounting	3
ANTH 101 and above		
BIOL 120 and above		
CHEM (except CHEM 111/CHEM 111L, CHEM 112/CHEM 112L, CHEM 333, CHEM 333L, CHEM 331L)		

CLAS 220 and above		
CRJU 101 and above		
CYBR 390	Special Topics in Cyber Intelligence	3
CSCE higher than 106		
ECHE 200 and above (except for ECHE 310)		
ECIV 200 and above		
ECON 224	Introduction to Economics	3
EDCE 210	Career Planning and Development	3
EDCE 340	Counseling Through a Multicultural Lens: Understanding Self and Others	3
EDCE 350	Interpersonal Communication Skills	3
EDCE 360	Introduction to the Counseling Profession	3
EDEX 205	Understanding the Foundations of Disability	3
EDEX 301	Introduction to Students with Autism	3
EDEX 523	Introduction to Exceptional Children	3
EDFI 300	Schools in Communities	3
EDFI 361	Comparative and International Education	3
EDLP 317	Law and Policy Studies in Education	3
EDPY 401	Learners and the Diversity of Learning	3
EDTE 202	Global Citizenship and Social Responsibility through Education	3
EDTE 218	Convergence and Divergence in African American and Jewish Relations: Historical and Contemporary	3
ELCT 200 and above		
EMCH 200 and above		
ENCP 200 and above		
ENGL 300 and above		
ENHS 223 and above		
ENTR 201	Entrepreneurism and Free Enterprise	3
ENTR 301	Startup Finance, Legal Structures, and Business Systems	3
ENTR 401	Applied Entrepreneurship	3
ENTR 501	Independent Study in Entrepreneurship	1-3
ENVR 101 and above		
EPID 349 and above		
EXSC 191 and above (except EXSC 335 if used as Biomedical Elective)		
FINA 333	Finance and Markets	3
HGEN 400 and above		
HPEB 300 and above		
HSPM 401 and above		
ITEC 200 and above		
MATH (except MATH 122)		
MGMT 371	Principles of Management	3
MGSC 290	Computer Information Systems in Business	3
MKTG 350	Principles of Marketing	3
NSCI 300 and above		
PEDU 302	Foundations of Coaching	3
PEDU 420	Motor Learning in Physical Education	3
PEDU 520	Observational Analysis of Sports Techniques and Tactics	3
PHIL 200 and above		

PHYS 200 and above (except PHYS 101/PHYS 101L, PHYS 102/PHYS 102L, PHYS 151/PHYS 151L, PHYS 155/PHYS 155L, PHYS 201/PHYS 201L)

POLI 101 and above

PSYC 101 and above

PUBH 302 and above

SOCY 101 and above

SPCH 200 and above

STAT except for STAT 201, STAT 205, or STAT 206

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### Electives (0-6 hours)

A minimum of 120 hours are required for the Biomedical Engineering, B.A. Electives are required if needed to reach to that total. Any course in the university can be used to satisfy the elective requirement (including additional electives in the major).

## 4. Major Requirements (36-38 hours)

### Major Courses (24-26 hours)

Course	Title	Credits
BMEN 101 or ENCP 101	Introduction to Biomedical Engineering Introduction to Engineering	1-3
BMEN 240	Cellular and Molecular Biology with Engineering Applications (must be passed with a grade of C or better)	4
BMEN 345	Human Anatomy and Physiology for Biomedical Engineers	4
BMEN 270	Materials in Medicine	3
BMEN 360	Biomedical Analysis	3
BMEN 302	Professional Development and Ethics in Biomedical Engineering	2
BMEN 340	Biochemistry with Engineering Applications	4
BMEN 363	Biomedical Instrumentation	3
<b>Total Credit Hours</b>		<b>24-26</b>

### Biomedical Engineering Major Electives (12 hours)

Students must take 12 credit hours of Biomedical Engineering electives.

Of these 12 credit hours, at most 3 credit hours may come from BMEN 499 (<https://academicbulletins.sc.edu/search/?P=BMEN%20499>).

Undergraduate courses that may be used to satisfy this requirement are listed below.

Course	Title	Credits
BMEN 212	Fundamentals of Biomedical Systems (must be passed with a grade of C or better)	3
BMEN 263	Introduction to Biomechanics	3
BMEN 290	Thermodynamics of Biomolecular Systems	3
BMEN 342	Infectious Disease & Immunology for Biomedical Engineers	3
BMEN 346	Medical Microbiology for Biomedical Engineers	3
BMEN 389	Special Topics in Biomedical Engineering for Undergraduates	1-3
BMEN 392	Fundamentals of Biochemical Engineering	3
BMEN 499	Independent Research	1-3
BMEN 532	Micro/nanofluidics and Lab-on-a-Chip	3

BMEN 537	Bio Nano/Micro Electro-Mechanical Systems	3
BMEN 546	Delivery of Bioactive Agents	3
BMEN 547	Immunoengineering	3
BMEN 548	Cardiovascular System: From Development to Disease	3
BMEN 565	Advanced Biomechanics	3
BMEN 572	Tissue Engineering	3
BMEN 575	Engineering of Soft Materials	3
BMEN 589	Special Topics in Biomedical Engineering	1-3
ECHE 430	Chemical Engineering Kinetics	3
EMCH 580	Mechanics of Solid Biomaterials	3
EXSC 335	Biomechanics of Human Movement	3

## Major Map

A major map is a layout of required courses in a given program of study, including critical courses and suggested course sequences to ensure a clear path to graduation.

Major maps are only a suggested or recommended sequence of courses required in a program of study. Please contact your academic advisor for assistance in the application of specific coursework to a program of study and course selection and planning for upcoming semesters.

### Biomedical Engineering, B.A.