

BIOMEDICAL ENGINEERING, B.S.

Begin Campus: Any Penn State Campus

End Campus: University Park

Program Description

The Biomedical Engineering curriculum emphasizes the continuous integration of classical and modern engineering principles with the life sciences and health care. Biomedical Engineers apply these skills to innovation in the health care industry, basic biological sciences, and the underpinning of medical practice.

Consistent with the mission of Penn State University and the College of Engineering, the Penn State Bachelor of Science program in Biomedical Engineering aims to create world-class engineers who will, after graduation, contribute to social and economic development through the application of engineering to the solution of problems in medicine and biology.

What is Biomedical Engineering?

Biomedical engineering is the application of the life sciences, mathematics, and engineering principals to define and solve problems in biology, medicine, healthcare, and other related fields. Biomedical engineers work to design, create, and improve medical devices such as prosthetics, artificial organs and medical imaging devices. They also develop instrumentation, medical information systems, and health management and care delivery systems to improve health care organizations. Many graduates of the biomedical engineering Bachelor of Science program also go on to pursue advanced degrees in medicine, engineering and related fields such as biostatistics, public health, and health administration.

You Might Like This Program If...

- You like applying traditional engineering skills and analysis to understand biological systems.
- You want to emphasize the integration of classical and modern engineering principles with the life sciences and healthcare.
- You are passionate about bridging the gap between medical professionals and the engineering community.

Entrance to Major

In order to be eligible for entrance to this major, students must satisfy the following requirements by the end of the semester during which the admission to major process is carried out.

- Completed 29-55 cumulative credits (credits completed at Penn State for which a quality letter grade was earned)
- Completed with a C or better the following courses: EDSGN 100, CHEM 110, MATH 140, MATH 141, and PHYS 211
- Attained at least a 2.6 cumulative grade point average

* In the event that the major is under enrollment control, a higher minimum cumulative grade-point average is likely to be needed and students must be enrolled in the College of Engineering or Division of Undergraduate Studies at the time of confirming their major choice.

Degree Requirements

For the Bachelor of Science degree in Biomedical Engineering, a minimum of 130-131 credits are required:

Requirement	Credits
General Education	45
Requirements for the Major	111-113

27 of the 45 credits for General Education are included in the Requirements for the Major. This includes: 9 credits of GN courses; 6 credits of GQ courses; 3 credits of GS courses; 9 credits of GWS courses.

Students in residence at the Commonwealth campuses may satisfy the course requirements for semesters 1-3. They should then transfer to University Park to begin studies in their major beginning with semester 4.

Requirements for the Major

To graduate, a student enrolled in the major must earn a grade of C or better in each course designated by the major as a C-required course, as specified by Senate Policy 82-44 (<https://senate.psu.edu/students/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/>).

Common Requirements for the Major (All Options)

Code	Title	Credits
Prescribed Courses		
BME 303	Bio-continuum Mechanics	3
BME 403	Biomedical Instrumentation Laboratory	1
BME 429	Biomedical Mechanics and Techniques Laboratory	2
BME 440	Biomedical Engineering Professional Seminar	1
BME 450W	Biomedical Senior Design	3
CHEM 111	Experimental Chemistry I	1
CHEM 112	Chemical Principles II	3
CHEM 113	Experimental Chemistry II	1
EMCH 210	Statics and Strength of Materials	5
MATH 230	Calculus and Vector Analysis	4
<i>Prescribed Courses: Require a grade of C or better</i>		
BME 201	Fundamentals of Cells and Molecules	3
BME 301	Analysis of Physiological Systems	4
BME 313	Thermodynamics for Biomedical Engineering	3
BME 401	Numerical Simulations in Biomedical Engineering	3
BME 402	Biomedical Instrumentation and Measurements	3
CHEM 110	Chemical Principles I	3
CMPSC 200	Programming for Engineers with MATLAB	3
EDSGN 100	Cornerstone Engineering Design	3
ENGL 202C	Effective Writing: Technical Writing	3
MATH 140	Calculus With Analytic Geometry I	4
MATH 141	Calculus with Analytic Geometry II	4
MATH 251	Ordinary and Partial Differential Equations	4
PHYS 211	General Physics: Mechanics	4
PHYS 212	General Physics: Electricity and Magnetism	4
Additional Courses		
Select 1 credit of First-Year Seminar		1
ECON 102	Introductory Microeconomic Analysis and Policy	3
or ECON 104	Introductory Macroeconomic Analysis and Policy	
<i>Additional Courses: Require a grade of C or better</i>		

CAS 100A	Effective Speech	3
or CAS 100B	Effective Speech	
ENGL 15	Rhetoric and Composition	3
or ENGL 30H	Honors Rhetoric and Composition	
Select one of the following:		4
BIOL 141 & BIOL 142	Introduction to Human Physiology and Physiology Laboratory	
BIOL 141 & BIOL 162	Introduction to Human Physiology and Human Anatomy and Physiology I - Laboratory	
BIOL 141 & BIOL 164	Introduction to Human Physiology and Human Anatomy and Physiology II - Laboratory	
BIOL 240W	Biology: Function and Development of Organisms	

Supporting Courses and Related Areas

Select 3 credits of Science or Engineering Elective courses from departmental list 3

Requirements for the Option

Select an option 23-24

**Requirements for the Option
Biochemical Option (24 credits)**

Code	Title	Credits
Prescribed Courses		
BME 409	Biofluid Mechanics	3
BME 413	Mass Transport in Biological Systems	3
BME 423	Reaction Kinetics of Biological Systems	3

Additional Courses

CHEM 202	Fundamentals of Organic Chemistry I	3
or CHEM 210	Organic Chemistry I	

Supporting Courses and Related Areas

Select 9 credits from Biochemical Option department list 9

Select 3 credits from Related Electives department list 3

Medical Imaging and Devices Option (23 credits)

Code	Title	Credits
Prescribed Courses		
BME 406	Medical Imaging	3
EE 210	Circuits and Devices	4

Additional Courses

Select 4 credits from the following: 4

CMPEN 270	Digital Design: Theory and Practice	
CMPEN 271 & CMPEN 275	Introduction to Digital Systems and Digital Design Laboratory	
EE 310	Electronic Circuit Design I	
EE 330	Engineering Electromagnetics	

Supporting Courses and Related Areas

Select 6 credits from the Related Electives department list 6

Select 6 credits from Medical Imaging and Device Option department list 6

Biomaterials Option (24 credits)

Code	Title	Credits
Prescribed Courses		
BME 443	Biomedical Materials	3

BME 446	Polymers in Biomedical Engineering	3
MATSE 201	Introduction to Materials Science	3

Additional Courses

BME 408	Solid Mechanics of Biological Materials	3
or BME 409	Biofluid Mechanics	
or BME 413	Mass Transport in Biological Systems	
CHEM 202	Fundamentals of Organic Chemistry I	3
or CHEM 210	Organic Chemistry I	

Supporting Courses and Related Areas

Select 3 credits from Related Electives department list 3

Select 6 credits from Biomaterials Option department list 6

Biomechanics Option (24 credits)

Code	Title	Credits
Prescribed Courses		
BME 408	Solid Mechanics of Biological Materials	3
BME 409	Biofluid Mechanics	3
EMCH 212	Dynamics	3
EMCH 315	Mechanical Response of Engineering Materials	2
EMCH 316	Experimental Determination of Mechanical Response of Materials	1

Supporting Courses and Related Areas

Select 9 credits from Biomechanics Option department list 9

Select 3 credits from Related Electives department list 3

General Education

Connecting career and curiosity, the General Education curriculum provides the opportunity for students to acquire transferable skills necessary to be successful in the future and to thrive while living in interconnected contexts. General Education aids students in developing intellectual curiosity, a strengthened ability to think, and a deeper sense of aesthetic appreciation. These are requirements for all baccalaureate students and are often partially incorporated into the requirements of a program. For additional information, see the General Education Requirements (<https://bulletins.psu.edu/undergraduate/general-education/baccalaureate-degree-general-education-program/>) section of the Bulletin and consult your academic adviser.

The keystone symbol appears next to the title of any course that is designated as a General Education course. Program requirements may also satisfy General Education requirements and vary for each program.

Foundations (grade of C or better is required and Inter-Domain courses do not meet this requirement.)

- **Quantification (GQ):** 6 credits
- **Writing and Speaking (GWS):** 9 credits

Breadth in the Knowledge Domains (Inter-Domain courses do not meet this requirement.)

- **Arts (GA):** 3 credits
- **Health and Wellness (GHW):** 3 credits
- **Humanities (GH):** 3 credits
- **Social and Behavioral Sciences (GS):** 3 credits
- **Natural Sciences (GN):** 3 credits

Integrative Studies

- **Inter-Domain Courses (Inter-Domain):** 6 credits

Exploration

- **GN**, may be completed with Inter-Domain courses: 3 credits
- **GA, GH, GN, GS, Inter-Domain courses**. This may include 3 credits of World Language course work beyond the 12th credit level or the requirements for the student's degree program, whichever is higher: 6 credits

University Degree Requirements

First Year Engagement

All students enrolled in a college or the Division of Undergraduate Studies at University Park, and the World Campus are required to take 1 to 3 credits of the First-Year Seminar, as specified by their college First-Year Engagement Plan.

Other Penn State colleges and campuses may require the First-Year Seminar; colleges and campuses that do not require a First-Year Seminar provide students with a first-year engagement experience.

First-year baccalaureate students entering Penn State should consult their academic adviser for these requirements.

Cultures Requirement

6 credits are required and may satisfy other requirements

- United States Cultures: 3 credits
- International Cultures: 3 credits

Writing Across the Curriculum

3 credits required from the college of graduation and likely prescribed as part of major requirements.

Total Minimum Credits

A minimum of 120 degree credits must be earned for a baccalaureate degree. The requirements for some programs may exceed 120 credits. Students should consult with their college or department adviser for information on specific credit requirements.

Quality of Work

Candidates must complete the degree requirements for their major and earn at least a 2.00 grade-point average for all courses completed within their degree program.

Limitations on Source and Time for Credit Acquisition

The college dean or campus chancellor and program faculty may require up to 24 credits of course work in the major to be taken at the location or in the college or program where the degree is earned. Credit used toward degree programs may need to be earned from a particular source or within time constraints (see Senate Policy 83-80 (<https://senate.psu.edu/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/#83-80>)). For more information, check the Suggested Academic Plan for your intended program.

Program Educational Objectives

Three to five years after graduation, we expect our graduates to be:

- employed in industry and government positions which include, but are not limited to, research and development, regulation, manufacturing, quality assurance and sales and marketing, or
- enrolled in graduate school, continuing education, or other professional development programs related to biomedical sciences and engineering, or

- enrolled in medical school, dental school, or other health-related professional training programs.

Student Outcomes

Student outcomes describe what students are expected to know and be able to do by the time of graduation. The Biomedical Engineering program is designed to enable students to:

1. Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. 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. Communicate effectively with a range of audiences
4. 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. Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. Acquire and apply new knowledge as needed, using appropriate learning strategies.

Academic Advising

The objectives of the university's academic advising program are to help advisees identify and achieve their academic goals, to promote their intellectual discovery, and to encourage students to take advantage of both in-and out-of class educational opportunities in order that they become self-directed learners and decision makers.

Both advisers and advisees share responsibility for making the advising relationship succeed. By encouraging their advisees to become engaged in their education, to meet their educational goals, and to develop the habit of learning, advisers assume a significant educational role. The advisee's unit of enrollment will provide each advisee with a primary academic adviser, the information needed to plan the chosen program of study, and referrals to other specialized resources.

READ SENATE POLICY 32-00: ADVISING POLICY (<https://senate.psu.edu/students/policies-and-rules-for-undergraduate-students/32-00-advising-policy/>)

University Park

Ariel Christine

Undergraduate Program Assistant
122H Chemical and Biomedical Engineering Building
University Park, PA 16802
814-863-6614
ajr311@psu.edu

Suggested Academic Plan

The suggested academic plan(s) listed on this page are the plan(s) that are in effect during the 2024-25 academic year. To access previous years' suggested academic plans, please visit the archive (<https://bulletins.psu.edu/undergraduate/archive/>) to view the appropriate Undergraduate Bulletin edition.

Biochemical Option: Biomedical Engineering, B.S. at University Park Campus

The course series listed below provides **only one** of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an **Academic Requirements** or **What If** report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

If you are starting at a campus other than the one this plan is ending at, please refer to: <http://advising.engr.psu.edu/degree-requirements/academic-plans-by-major.aspx>

First Year

Fall	Credits	Spring	Credits
CHEM 110 (GN) ^{*#†}	3	CHEM 112 (GN)	3
CHEM 111 (GN)	1	CHEM 113 (GN)	1
EDSGN 100 ^{*#}	3	MATH 141 or 141E (GQ) ^{*†#†}	4
MATH 140 or 140E (GQ) ^{*†#†}	4	PHYS 211 (GN, PHYSICS 211L & PHYSICS 211R) ^{*#†}	4
BME 100 (or First Year Seminar) [†]	1	ENGL 15, 30H, or ESL 15 (GWS) ^{††}	3
ECON 102 or 104 (GS) [†]	3	General Education Course [†]	3
	15		18

Second Year

Fall	Credits	Spring	Credits
BIOL 141 [*]	3	BME 201 [*]	3
BIOL 142, 162, or 164 [*]	1	CHEM 202 or 210	3
EMCH 210	5	CMPSC 200	3
MATH 251 [*]	4	MATH 230	4
PHYS 212 (PHYSICS 212L & PHYSICS 212R) [*]	4	General Education Course [†]	3
	17		16

Third Year

Fall	Credits	Spring	Credits
BME 301 [*]	4	BME 401 [*]	3
BME 303	3	BME 402 [*]	3
BME 313 [*]	3	BME 403	1
Related Technical Elective	3	BME 409	3
General Education Course [†]	3	BME 413	3
		ENGL 202C (GWS) ^{††}	3
	16		16

Fourth Year

Fall	Credits	Spring	Credits
BME 429	2	BME 423	3
BME 440	1	BME 450W	3
Biochemical Elective	3	Biochemical Elective	3
Science or Engineering Elective	3	Biochemical Elective	3
CAS 100A or 100B (GWS) ^{††}	3	General Education Course [†]	3
General Education Course [†]	3	General Education Course (GHW) [†]	1.5

General Education Course (GHW)[†] 1.5

16.5

16.5

Total Credits 131

- * Course requires a grade of C or better for the major
- ‡ Course requires a grade of C or better for General Education
- # Course is an Entrance to Major requirement
- † Course satisfies General Education and degree requirement

University Requirements and General Education Notes:

US and IL are abbreviations used to designate courses that satisfy Cultural Diversity Requirements (United States and International Cultures).

W, M, X, and Y are the suffixes at the end of a course number used to designate courses that satisfy University Writing Across the Curriculum requirement.

General Education includes Foundations (GWS and GQ), Knowledge Domains (GHW, GN, GA, GH, GS) and Integrative Studies (Inter-domain) requirements. N or Q (Honors) is the suffix at the end of a course number used to help identify an Inter-domain course, but the inter-domain attribute is used to fill audit requirements. Foundations courses (GWS and GQ) require a grade of 'C' or better.

All incoming Schreyer Honors College first-year students at University Park will take ENGL 137H/CAS 137H in the fall semester and ENGL 138T/CAS 138T in the spring semester. These courses carry the GWS designation and satisfy a portion of that General Education requirement. If the student's program prescribes GWS these courses will replace both ENGL 15/ENGL 30H and CAS 100A/CAS 100B/CAS 100C. Each course is 3 credits.

College Notes:

- Students who are interested in medical school should substitute BIOL 240W (4) for BIOL 141 (3) & BIOL 142 (1).
- CHEM 210 is required for students who are interested in medical school or who plan to take advanced organic chemistry.
- CMPSC 200 is required because 300- and 400-level BME courses use MATLAB programming.
- The department website lists courses acceptable as Biochemical Electives, Medical Imaging and Device Electives, Biomaterials Electives, Biomechanics Electives, Related Electives, and Science or Engineering Electives.
- Students who complete the ROTC Program may substitute 3 ROTC credits for the GHW requirement and 3 ROTC credits for a Science or Engineering Elective.
- **These courses offered at University Park in Fall semester ONLY:**
 - BME 301
 - BME 303
 - BME 313
 - BME 440
- **These courses offered at University Park in Spring semester ONLY:**
 - BME 201
 - BME 401
 - BME 402
 - BME 403

- BME 409
- BME 413
- BME 423

Biomaterials Option: Biomedical Engineering, B.S. at University Park Campus

The course series listed below provides **only one** of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an **Academic Requirements** or **What If** report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

If you are starting at a campus other than the one this plan is ending at, please refer to: <http://advising.engr.psu.edu/degree-requirements/academic-plans-by-major.aspx>

First Year

Fall	Credits	Spring	Credits
CHEM 110 (GN) ^{*#†}	3	CHEM 112 (GN)	3
CHEM 111 (GN)	1	CHEM 113 (GN)	1
EDSGN 100 ^{*#}	3	MATH 141 or 141E (GQ) ^{*†#†}	4
MATH 140 or 140E (GQ) ^{*†#†}	4	PHYS 211 (GN, PHYSICS 211L & PHYSICS 211R) ^{*#†}	4
BME 100 (or First Year Seminar) [†]	1	ENGL 15, 30H, or ESL 15 (GWS) ^{††}	3
ECON 102 or 104 (GS) [†]	3	General Education Course [†]	3
	15		18

Second Year

Fall	Credits	Spring	Credits
BIOL 141 [*]	3	BME 201 [*]	3
BIOL 142, 162, or 164 [*]	1	CHEM 202 or 210	3
EMCH 210	5	CMPSC 200	3
MATH 251 [*]	4	MATH 230	4
PHYS 212 (PHYSICS 212L & PHYSICS 212R) [*]	4	General Education Course [†]	3
	17		16

Third Year

Fall	Credits	Spring	Credits
BME 301 [*]	4	BME 401 [*]	3
BME 303	3	BME 402 [*]	3
BME 313 [*]	3	BME 403	1
BME 443	3	BME 409 or 413 (or Biomaterials Elective)	3
MATSE 201	3	ENGL 202C (GWS) ^{††}	3
		General Education Course [†]	3
	16		16

Fourth Year

Fall	Credits	Spring	Credits
BME 429	2	BME 450W	3
BME 440	1	Biomaterials Elective	3
BME 446	3	Related Technical Elective	3
CAS 100A or 100B (GWS) ^{††}	3	Science or Engineering Elective	3
BME 408 (or Biomaterials Elective)	3	General Education Course [†]	3
General Education Course [†]	3	General Education Course (GHW) [†]	1.5

General Education Course (GHW)[†] 1.5

16.5

16.5

Total Credits 131

- * Course requires a grade of C or better for the major
- ‡ Course requires a grade of C or better for General Education
- # Course is an Entrance to Major requirement
- † Course satisfies General Education and degree requirement

University Requirements and General Education Notes:

US and IL are abbreviations used to designate courses that satisfy Cultural Diversity Requirements (United States and International Cultures).

W, M, X, and Y are the suffixes at the end of a course number used to designate courses that satisfy University Writing Across the Curriculum requirement.

General Education includes Foundations (GWS and GQ), Knowledge Domains (GHW, GN, GA, GH, GS) and Integrative Studies (Inter-domain) requirements. N or Q (Honors) is the suffix at the end of a course number used to help identify an Inter-domain course, but the inter-domain attribute is used to fill audit requirements. Foundations courses (GWS and GQ) require a grade of 'C' or better.

All incoming Schreyer Honors College first-year students at University Park will take ENGL 137H/CAS 137H in the fall semester and ENGL 138T/CAS 138T in the spring semester. These courses carry the GWS designation and satisfy a portion of that General Education requirement. If the student's program prescribes GWS these courses will replace both ENGL 15/ENGL 30H and CAS 100A/CAS 100B/CAS 100C. Each course is 3 credits.

College Notes:

- Students who are interested in medical school should substitute BIOL 240 (4) for BIOL 141 (3) & BIOL 142 (1).
- CHEM 210 is required for students who are interested in medical school or who plan to take advanced organic chemistry.
- CMPSC 200 is required because 300- and 400-level BME courses use MATLAB programming.
- The department website lists courses acceptable as Biochemical Electives, Medical Imaging and Device Electives, Biomaterials Electives, Biomechanics Electives, Related Electives, and Science or Engineering Electives.
- Students who complete the ROTC Program may substitute 3 ROTC credits for the GHW requirement and 3 ROTC credits for a Science or Engineering Elective.
- **These courses offered at University Park in fall semester only:**
 - BME 301
 - BME 303
 - BME 313
 - BME 429
 - BME 440
 - BME 443
 - BME 446
- **These courses offered at University Park in spring semester only:**

- BME 201
- BME 401
- BME 402
- BME 403
- BME 409
- BME 450W

Biomechanics Option: Biomedical Engineering, B.S. at University Park Campus

The course series listed below provides **only one** of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an **Academic Requirements** or **What If** report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

If you are starting at a campus other than the one this plan is ending at, please refer to: <http://advising.engr.psu.edu/degree-requirements/academic-plans-by-major.aspx>

First Year

Fall	Credits Spring	Credits
BME 100 (or First Year Seminar) [†]	1 CHEM 112 (GN)	3
CHEM 110 (GN) ^{*#†}	3 CHEM 113 (GN)	1
CHEM 111 (GN)	1 ENGL 15, 30H, or ESL 15 ^{††}	3
ECON 102 or 104 (GS) [†]	3 MATH 141 or 141E (GQ) ^{*#††}	4
EDSGN 100 ^{*#}	3 PHYS 211 (GN, PHYS 211L & PHYS 211R) ^{*#†}	4
MATH 140 or 140E (GQ) ^{*#††}	4 General Education Course [†]	3
	15	18

Second Year

Fall	Credits Spring	Credits
BIOL 141 [*]	3 BME 201 [*]	3
BIOL 142, 162, or 164 [*]	1 CMPSC 200	3
EMCH 210	5 EMCH 212	3
MATH 251 [*]	4 MATH 230	4
PHYS 212 (PHYS 212L & PHYS 212R) [*]	4 General Education Course [†]	3
	17	16

Third Year

Fall	Credits Spring	Credits
BME 301 [*]	4 BME 401 [*]	3
BME 303	3 BME 402 [*]	3
BME 313 [*]	3 BME 403	1
EMCH 315	2 BME 409	3
EMCH 316	1 ENGL 202C (GWS) ^{††}	3
General Education Course [†]	3 Biomechanics Elective	3
	16	16

Fourth Year

Fall	Credits Spring	Credits
BME 408	3 BME 450W	3
BME 429	2 Biomechanics Elective	3
BME 440	1 Related Technical Elective	3
CAS 100A or 100B (GWS) ^{††}	3 Science or Engineering Elective	3
Related Technical Elective	3 General Education Course [†]	3
General Education Course [†]	3 General Education Course (GHW) [†]	1.5

General Education Course (GHW) [†]	1.5	
	16.5	16.5

Total Credits 131

- * Course requires a grade of C or better for the major
- ‡ Course requires a grade of C or better for General Education
- # Course is an Entrance to Major requirement
- † Course satisfies General Education and degree requirement

University Requirements and General Education Notes:

US and IL are abbreviations used to designate courses that satisfy Cultural Diversity Requirements (United States and International Cultures).

W, M, X, and Y are the suffixes at the end of a course number used to designate courses that satisfy University Writing Across the Curriculum requirement.

General Education includes Foundations (GWS and GQ), Knowledge Domains (GHW, GN, GA, GH, GS) and Integrative Studies (Inter-domain) requirements. N or Q (Honors) is the suffix at the end of a course number used to help identify an Inter-domain course, but the inter-domain attribute is used to fill audit requirements. Foundations courses (GWS and GQ) require a grade of 'C' or better.

All incoming Schreyer Honors College first-year students at University Park will take ENGL 137H/CAS 137H in the fall semester and ENGL 138T/CAS 138T in the spring semester. These courses carry the GWS designation and satisfy a portion of that General Education requirement. If the student's program prescribes GWS these courses will replace both ENGL 15/ENGL 30H and CAS 100A/CAS 100B/CAS 100C. Each course is 3 credits.

College Notes

- Students who are interested in medical school should substitute BIOL 240W (4) for BIOL 141 (3) & BIOL 142 (1).
- CHEM 210 is required for students who are interested in medical school or who plan to take advanced organic chemistry.
- CMPSC 200 is required because 300- and 400-level BME courses use MATLAB programming.
- The department website lists courses acceptable as Biochemical Electives, Medical Imaging and Device Electives, Biomaterials Electives, Biomechanics Electives, Related Electives, and Science or Engineering Electives.
- Students who complete the ROTC Program may substitute 3 ROTC credits for the GHW requirement and 3 ROTC credits for a Science or Engineering Elective.
- **These courses offered at University Park in fall semester only:**
 - BME 301
 - BME 303
 - BME 313
 - BME 440
- **These courses offered at University Park in spring semester only:**
 - BME 201
 - BME 401
 - BME 402

- BME 403
- BME 409

Medical Imaging & Devices Option: Biomedical Engineering, B.S. at University Park Campus

The course series listed below provides **only one** of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an **Academic Requirements** or **What If** report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

If you are starting at a campus other than the one this plan is ending at, please refer to: <http://advising.engr.psu.edu/degree-requirements/academic-plans-by-major.aspx>

First Year

Fall	Credits Spring	Credits
BME 100 (or First Year Seminar) [†]	1 CHEM 112 (GN)	3
CHEM 110 (GN) ^{*#†}	3 CHEM 113 (GN)	1
CHEM 111 (GN)	1 ENGL 15, 30H, or ESL 15 ^{††}	3
ECON 102 or 104 (GS) [†]	3 MATH 141 or 141E (GQ) ^{*†#†}	4
EDSGN 100 ^{*#}	3 PHYS 211 (GN, PHYS 211L and PHYS 211R) ^{*#†}	4
MATH 140 or 140E (GQ) ^{*†#†}	4	
	15	15

Second Year

Fall	Credits Spring	Credits
BIOL 141 [*]	3 BME 201 [*]	3
BIOL 142, 162, or 164 [*]	1 CMPSC 200	3
EMCH 210	5 EE 210	4
MATH 251 [*]	4 MATH 230	4
PHYS 212 (PHYS 212L and PHYS 212R) [*]	4 General Education Course [†]	3
	17	17

Third Year

Fall	Credits Spring	Credits
BME 301 [*]	4 BME 401 [*]	3
BME 303	3 BME 402 [*]	3
BME 313 [*]	3 BME 403	1
BME 406	3 ENGL 202C (GWS) ^{††}	3
EE 310, 330, or CMPEN 270	4 Medical Imaging and Devices Elective	3
	Related Technical Elective	3
	17	16

Fourth Year

Fall	Credits Spring	Credits
BME 429	2 BME 450W	3
BME 440	1 Medical Imaging and Devices Elective	3
CAS 100A or 100B (GWS) ^{††}	3 Related Technical Elective	3
Science or Engineering Elective	3 General Education Course [†]	3
General Education Course [†]	3 General Education Course [†]	3
General Education Course [†]	3 General Education Course (GHW) [†]	1.5

General Education Course (GHW)[†] 1.5

16.5

16.5

Total Credits 130

- * Course requires a grade of C or better for the major
- ‡ Course requires a grade of C or better for General Education
- # Course is an Entrance to Major requirement
- † Course satisfies General Education and degree requirement

University Requirements and General Education Notes:

US and IL are abbreviations used to designate courses that satisfy Cultural Diversity Requirements (United States and International Cultures).

W, M, X, and Y are the suffixes at the end of a course number used to designate courses that satisfy University Writing Across the Curriculum requirement.

General Education includes Foundations (GWS and GQ), Knowledge Domains (GHW, GN, GA, GH, GS) and Integrative Studies (Inter-domain) requirements. N or Q (Honors) is the suffix at the end of a course number used to help identify an Inter-domain course, but the inter-domain attribute is used to fill audit requirements. Foundations courses (GWS and GQ) require a grade of 'C' or better.

All incoming Schreyer Honors College first-year students at University Park will take ENGL 137H/CAS 137H in the fall semester and ENGL 138T/CAS 138T in the spring semester. These courses carry the GWS designation and satisfy a portion of that General Education requirement. If the student's program prescribes GWS these courses will replace both ENGL 15/ENGL 30H and CAS 100A/CAS 100B/CAS 100C. Each course is 3 credits.

College Notes:

- Students who are interested in medical school should substitute BIOL 240W (4) for BIOL 141 (3) & BIOL 142 (1).
- CHEM 210 is required for students who are interested in medical school or who plan to take advanced organic chemistry.
- CMPSC 200 is required because 300- and 400-level BME courses use MATLAB programming.
- The department website lists courses acceptable as Biochemical Electives, Medical Imaging and Device Electives, Biomaterials Electives, Biomechanics Electives, Related Electives, and Science or Engineering Electives.
- Students who complete the ROTC Program may substitute 3 ROTC credits for the GHW requirement and 3 ROTC credits for a Science or Engineering Elective.
- **These courses offered at University Park in Fall semester ONLY:**
 - BME 301
 - BME 303
 - BME 313
 - BME 406
 - BME 440
- **These courses offered at University Park in Spring semester ONLY:**
 - BME 201
 - BME 401

- BME 402
- BME 403

Career Paths

Careers

Medical device development; diagnostic and therapeutic tool design; physiological system modeling for the healthcare and pharmaceutical industries; medical school.

MORE INFORMATION ABOUT POTENTIAL CAREER OPTIONS FOR GRADUATES OF THE BIOMEDICAL ENGINEERING PROGRAM (<https://career.engr.psu.edu/>)

Opportunities for Graduate Studies

The biomedical engineering graduate program is a part of the Penn State Intercollege Graduate Degree Program in Bioengineering. The highly flexible, mentored curriculum includes fundamental coursework in bioengineering and a number of ancillary areas including physics, chemistry, biology, materials research, esthesiology, orthopedics and rehabilitation, and more. Our students enjoy state-of-the-art research facilities and an exclusive partnership with the Penn State Hershey Medical Center. The unique landscape of the bioengineering graduate program fosters learning and collaboration among students, engineers, clinicians, and professionals in the biomedical industry.

MORE INFORMATION ABOUT OPPORTUNITIES FOR GRADUATE STUDIES (<https://www.bme.psu.edu/students/graduate/>)

Professional Resources

- Biomedical Engineering Society (<http://www.bme.psu.edu/students/resources/student-groups.aspx>)
- Biomedical Sciences Club

Accreditation

The Bachelor of Science in Biomedical Engineering at University Park is accredited by the Engineering Accreditation Commission of ABET, <https://www.abet.org>, under the commission's General Criteria and Program Criteria for Bioengineering and Biomedical and Similarly Named Engineering Programs.

Professional Licensure/Certification

Many U.S. states and territories require professional licensure/certification to be employed. If you plan to pursue employment in a licensed profession after completing this program, please visit the Professional Licensure/Certification Disclosures by State (<https://opair.psu.edu/plc/dashboard/>) interactive map.

Contact

University Park

DEPARTMENT OF BIOMEDICAL ENGINEERING
122H Chemical and Biomedical Engineering Building
University Park, PA 16802
814-863-6614
ajr311@psu.edu

<https://www.bme.psu.edu/index.aspx> (<https://www.bme.psu.edu/>)