BIOENGINEERING (BS)

This program was approved for students entering the university in the Summer 2022–Spring 2023 catalog year. For more information about catalog year, go to Catalog Year Information (http://catalog.louisville.edu/undergraduate/university-wide-unit-specific-policies/catalog-year/).

Bachelor of Science in Bioengineering
Unit: Speed School of Engineering (http://engineering.louisville.edu/) (SS)
Department: Bioengineering (https://engineering.louisville.edu/bioengineering/)
Academic Plan Code(s): BE_ _BBE

Program Information

Bioengineering is a relatively new engineering discipline when compared to the long-standing traditions of other fields of engineering. A bioengineer uses traditional engineering skills and tools to analyze and solve problems in biology and medicine. Bioengineers interact with biologists, biochemists, physicians, physiologists, and therapists to design, develop and manufacture instruments, devices, and software, or to develop new procedures to solve clinical problems.

The Bachelor of Science in Bioengineering degree is designed to provide students with a rigorous education grounded in basic mathematics and sciences traditional to all engineering programs, but focuses additionally on chemistry, biology and physiology, and the opportunity to gain practical experience within the biomedical or bioengineering industry. In the early part of their academic program, students are exposed to fundamentals of engineering and design in mechanical and electrical engineering before proceeding to core Bioengineering classes.

The Bachelor of Science in Bioengineering degree program is accredited by the Engineering Accreditation Commission (EAC) of ABET, www.abet.org (http://www.abet.org). The Master of Engineering in Bioengineering degree program is accredited by the Engineering Accreditation Commission (EAC) of ABET, www.abet.org (http://www.abet.org).

Degree Summary

Code	Title	Hours
General Education Requirements (http://catalog.louisville.edu/undergraduate/general-education-requirements/) [1]		31
	(19 hours of General Education requirements may be satisfied through coursework required by the degree program)	
College/School Requirements [1]		35
Program/Major Requirements		53
Supporting Courses		28
Minimum Total Hours		**128**

[1] Some courses required in this degree program satisfy multiple requirements. To complete the degree in the minimum number of hours listed, some hours from the General Education Requirements must be satisfied by courses defined by the unit and/or program. Using other courses to satisfy General Education requirements will require additional hours to complete the degree requirements. See the Degree Requirements and/or Track tabs for specific coursework.

Specific coursework information can be found on the Degree Requirements tab.

General Education Requirements

Code	Title	Hours
General Education Requirements (http://catalog.louisville.edu/undergraduate/general-education-requirements/)		31
The following courses are required by the program and satisfy the respective General Education Requirement(s):		
CHEM 201	General Chemistry I	
CHEM 207	Introduction to Chemical Analysis I	
COMM 111	Introduction to Public Speaking	
or COMM 112	Business and Professional Speaking	
ENGL 101	Introduction to College Writing	
ENGL 102	Intermediate College Writing	
ENGR 101	Engineering Analysis I	
PHYS 298	Introductory Mechanics, Heat and Sound	

All degrees require the completion of the University-wide General Education Program (link provided above). To complete the degree in the **minimum number of hours** listed on the Overview tab, some hours from the General Education Requirements must be satisfied by courses defined by the unit and/or program.

College/School Requirements

Code	Title	Hours
Speed School Core [1]		
CHEM 201	General Chemistry I [1]	3
CHEM 207	Introduction to Chemical Analysis I [1]	1
Select one of the following: [1]		3
COMM 111	Introduction to Public Speaking	
COMM 112	Business and Professional Speaking	
ENGL 101	Introduction to College Writing [1,2]	3
ENGL 102	Intermediate College Writing [1,2]	3
ENGR 101	Engineering Analysis I [1]	4
ENGR 102	Engineering Analysis II	4
ENGR 110	Engineering Methods, Tools, and Practice I	2
ENGR 111	Engineering Methods, Tools and Practice II	2
ENGR 201	Engineering Analysis III	4
ENGR 205	Differential Equations for Engineering	2
PHYS 298	Introductory Mechanics, Heat and Sound [1]	4
Minimum Total Hours		**35**

Program/Major Requirements

Code	Title	Hours
Bioengineering Department [3, 4]		
BE 101	Introduction to Bioengineering	1
BE 288	Bioengineering Co-op Education Seminar	0
BE 289	Bioengineering Co-op Education I	1
BE 310	Biotransport Phenomena	3
BE 322	Circuits and Devices for Bioengineers	3
BE 340	Computational Methodologies in Bioengineering	3
BE 354	Anatomy and Physiology	3
BE 359	Cell and Molecular Biology for Bioengineers	3
BE 360	Biomechanics Principles	3
BE 389	Bioengineering Co-op Education II	1
BE 420	Biosystems & Signals	3
BE 423	Bioengineering Measurements Laboratory	2
BE 430	Biosystems Controls	3
BE 450	Biomaterials & Biocompatibility	3
BE 489	Bioengineering Co-op Education III	1
BE 491	Capstone A	3
BE 497	CAPSTONE B	3
Bioengineering Electives (select 9 credit hours from the following): [4]		9
BE 453	Introduction to Molecular Bioengineering	
BE 460	Biomechanics of Tissues and Organs	
BE 480	Biomedical Device Design	
BE 500	Special Topics in Bioengineering	
BE 522	Biomedical Acoustics	
BE 524	LabVIEW for Bioengineers	
BE 530	Machine Learning in Python	
BE 540	Machine Learning in Medicine	
BE 542	Medical Image Computing	
BE 552	Introduction to Tissue Engineering	
BE 553	Nanoscale Bioengineering: Application and Methodology of Nanobiomaterials in Bioengineering	
BE 581	Advanced Computer-Aided Design and Manufacturing for Bioengineers	
BE 593	Independent Study in Bioengineering	
BIOC 545	Biochemistry I	
BIOC 547	Advanced Biochemistry II	
BIOC 645	Advanced Biochemistry I	
BIOC 647	Advanced Biochemistry II	
CHEM 545	Biochemistry I	
CHEM 547	Biochemistry II	
CHEM 645	Advanced Biochemistry I	
CHEM 647	Advanced Biochemistry II	
IE 430	Quality Control	
ME 422	Machine Design I	
Bioengineering Core		
CHEM 202	General Chemistry II	3
CHEM 208	Introduction to Chemical Analysis II	1
CHEM 209	Introduction to Chemical Analysis III	1
Minimum Total Hours		**53**

Code	Title	Hours
Supporting Courses		
BIOL 240	Unity of Life	3
CEE 205	Mechanics I: Statics	3
CHEM 341	Organic Chemistry I	3
CHEM 343	Organic Chemistry Laboratory I	2
IE 360	Probability and Statistics for Engineers	3
ME 206	Mechanics II: Dynamics	3
ME 251	Thermodynamics I	3
PHYS 295	Introductory Laboratories I	1
PHYS 299	Introductory Electricity, Magnetism and Light	4
ENGR 151	Engineering Graphics Technology	1
ENGR 330	Linear Algebra for Engineering	2
Minimum Total Hours		**28**

Candidates for the Bachelor of Science degree must be in Good Standing (university GPA ≥ 2.25) and must attain a grade point average of at least 2.25 for all courses used to satisfy degree requirements.

Code	Title	Hours
Culminating Undergraduate Experience (Graduation requirement)		
Requirement fulfilled by completing:		
BE 497	CAPSTONE B	

1 This course is a General Education requirement for the program; see louisville.edu/provost/ger/ (http://www.louisville.edu/provost/ger/) for the listing, by academic year, of AH/D1/D2/SB/SBH Electives which satisfy the University-wide General Education requirements. Note that the 12-hour total for the AH/D1/D2/SB/SBH electives assumes the use of double counting of D1/D2 with another category.

2 Students completing ENGL 105 in lieu of ENGL 101 or ENGL 102 satisfy the General Education and Engineering Fundamentals requirements for Written Communication. However, an additional 3-hr Writing (WR) course or honors Written Communication (WC) course may be needed to satisfy program credit hour requirements.

3 A student is allowed to accumulate no more than two D+ or lower grades in BE prefixed courses (including BE approved elective courses) to graduate with a baccalaureate degree. If a student accumulates any D+ or lower grade, it is strongly recommended that the course be repeated to earn a better grade before proceeding to the next course in the sequence. If a student accumulates a third D+ or lower grade, the student is required to repeat the course to earn a better grade.

4 A maximum of one non-BE course can be taken as an elective. Students must meet all course prerequisites. The courses chosen to fulfill this elective requirement cannot be used to satisfy any other program or degree requirements.

Flight Plan

Year 1

Fall		Hours
CHEM 201	General Chemistry I	3
CHEM 207	Introduction to Chemical Analysis I	1
CHEM 208	Introduction to Chemical Analysis II	1
ENGL 101	Introduction to College Writing	3
ENGR 101	Engineering Analysis I	4

ENGR 110	Engineering Methods, Tools, and Practice I	2
General Education: Cardinal Core Arts & Humanities, Social & Behavioral Sciences, or Social & Behavioral Sciences Historical Persepective US Diversity - AHD1, SBD1, or SBHD1		3
	Hours	**17**
Spring		
BE 101	Introduction to Bioengineering	1
CHEM 202	General Chemistry II	3
CHEM 209	Introduction to Chemical Analysis III	1
ENGL 102	Intermediate College Writing	3
ENGR 102	Engineering Analysis II	4
ENGR 111	Engineering Methods, Tools and Practice II	2
PHYS 298	Introductory Mechanics, Heat and Sound	4
	Hours	**18**
Summer		
CEE 205	Mechanics I: Statics	3
ENGR 151	Engineering Graphics Technology	1
ENGR 201	Engineering Analysis III	4
PHYS 295	Introductory Laboratories I	1
General Education: Cardinal Core Arts & Humanities, Social & Behavioral Sciences, or Social & Behavioral Sciences Historical Persepective - AH, SB, or SBH		3
	Hours	**12**
Year 2		
Fall		
BIOL 240	Unity of Life	3
CHEM 341	Organic Chemistry I	3
ENGR 205	Differential Equations for Engineering	2
ME 206	Mechanics II: Dynamics	3
ME 251	Thermodynamics I	3
PHYS 299	Introductory Electricity, Magnetism and Light	4
	Hours	**18**
Spring		
BE 288	Bioengineering Co-op Education Seminar	0
BE 310	Biotransport Phenomena	3
BE 354	Anatomy and Physiology	3
BE 359	Cell and Molecular Biology for Bioengineers	3
BE 360	Biomechanics Principles	3
General Education: Cardinal Core Arts & Humanities, Social & Behavioral Sciences, or Social & Behavioral Sciences Historical Persepective - AH, SB, or SBH		3
	Hours	**15**
Summer		
BE 322	Circuits and Devices for Bioengineers	3
BE 340	Computational Methodologies in Bioengineering	3
BE 450	Biomaterials & Biocompatibility	3
Select one of the following:		3
COMM 111	Introduction to Public Speaking	
COMM 112	Business and Professional Speaking	
	Hours	**12**
Year 3		
Fall		
BE 289	Bioengineering Co-op Education I	1
	Hours	**1**
Spring		
BE 420	Biosystems & Signals	3
BE 423	Bioengineering Measurements Laboratory	2
Bioengineering Elective I		3
CHEM 343	Organic Chemistry Laboratory I	2
ENGR 330	Linear Algebra for Engineering	2
IE 360	Probability and Statistics for Engineers	3
General Education: Cardinal Core Arts & Humanities, Social & Behavioral Sciences, or Social & Behavioral Sciences Historical Persepective - AH, SB, or SBH		3
	Hours	**18**
Summer		
BE 389	Bioengineering Co-op Education II	1
	Hours	**1**
Year 4		
Fall		
BE 430	Biosystems Controls	3
BE 491	Capstone A	3
BE 497	CAPSTONE B	3
Bioengineering Elective II		3
Bioengineering Elective III		3
	Hours	**15**
Spring		
BE 489	Bioengineering Co-op Education III	1
	Hours	**1**
	Minimum Total Hours	**128**

Degree Audit Report

Degree Audit reports illustrate how your completed courses fulfill the requirements of your academic plan. What-if reports allow you to compare the courses you have completed in your current academic plan to the courses required in another academic plan. Should you have questions about either report, please consult with your academic advisor.

To create either report:

1. Log into your ULink account.
2. Click on the Academic Progress tile.
3. Next, click on "View my Degree Audit" to run a Degree Audit report in the Undergraduate Advising area.
4. To create a What-if report, click on "Create a What-if Advisement Report."

Click here to run a Degree Audit report, or create a What-if report. (https://ulink.louisville.edu)

Flight Planner

Based on your major, the Flight Planner tool may be available for you to create a personalized Flight Plan. The Flight Planner can be found in the ULink Student Center. Consult with your advisor for assistance with the Flight Planner.

The Bachelor of Science in Bioengineering (BE BBE) program prepares students to meet the requirements for certification and/or licensure. If you plan to pursue professional licensure or certification you should first determine your state's criteria for examination and licensure to see how/if our program meets those requirements prior to enrollment. We recommend that you also contact your state's licensing board directly to verify that the requirements have not changed recently and to answer any questions especially those regarding additional requirements beyond the degree.

More information about certification or licensure is available at the following website: https://louisville.edu/oapa/licensure-information (https://louisville.edu/oapa/licensure-information/) (you may search by school or by the name of the program then click on 'View Details' to display the information).

For programs with an online option, more information about certification or licensure is available here: http://louisville.edu/online/About-Us

(http://louisville.edu/online/About-Us/) (please scroll down near the bottom of the page and click on the licensing disclosures tab).