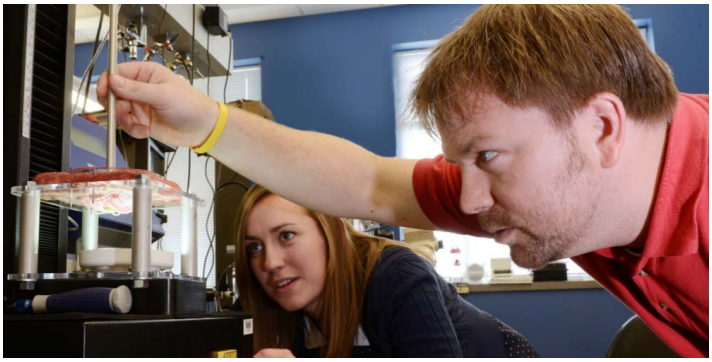
BIOENGINEERING (BS)



This program was approved for students entering the university in the Summer 2025-Spring 2026 catalog year. For more information about catalog year, go to Catalog Year Information (https://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, https://www.abet.org, under the Commission's General Criteria and the Program Criteria for Bioengineering and Biomedical and Similarly Named Engineering Programs.

Students who graduate from ABET-accredited programs are authorized to sit for the Fundamentals of Engineering (FE) exam, and are encouraged to do so. Completion of the FE Exam is not required for any of the Engineering School's degree programs. The FE Exam is a multiple-choice test, administered by the National Council of Examiners for Engineering and Surveying (NCEES). Passing the FE exam is the first step to becoming licensed as a Professional Engineer. Engineers who have successfully passed the FE exam are considered "Engineers in Training (EIT)". Once an EIT has accumulated four years of acceptable work experience in their field of engineering, they are then able to sit for the Principles and Practice of Engineering (PE) exam, in order to become a professionally licensed engineer. The PE exams go beyond testing academic knowledge and require knowledge gained in engineering practice. The requirement to accumulate work experience before taking a PE exam means that the program is not designed to prepare students for immediate licensure.

Degree Summary

Code	Title	Hours
General Education Requirements (https://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.

Incoming Student Admission Criteria

High School Curriculum Requirements: All schools require graduation from an accredited high school and completion of the Kentucky Pre-College Curriculum requirements. In addition, Speed School requires successful completion of the following courses in high school:

- Calculus or pre-calculus
- Chemistry

Students with ACT / SAT Scores

- ACT composite and math scores of 25 OR SAT combined CR+M score of 1200 and math score of 590. A 3.0 GPA on a 4.0 scale

OR

- ACT composite and math scores of 24 OR SAT combined CR+M score of 1160 and math score of 570. A 3.5 GPA on a 4.0 scale

Students without ACT / SAT Scores

- HS GPA of 3.0 (or better) on a 4.0 scale
- Comprehensive transcript evaluation
- Review of Student Resume

Transferring to Engineering BS degree programs

Students with 24 hours or more transferable semester hours will have a minimum college grade point average of 2.8 and at least B-minus grades in each of the following courses: ENGR 181 (or equivalent) and Intro to Chemistry (CHEM 101 or equivalent).

It is recommended students successfully complete Physics I (PHYS 298 or equivalent) before transferring to the J.B. Speed School of Engineering.

General Education Requirements

Code	Title	Hours
General Education Requirements (https://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 - S (https://catalog.louisville.edu/undergraduate/general-education-requirements/)	
CHEM 207	Introduction to Chemical Analysis I - SL (https://catalog.louisville.edu/undergraduate/general-education-requirements/)	
COMM 111	Introduction to Public Speaking - OC (https://catalog.louisville.edu/undergraduate/general-education-requirements/)	
or COMM 112	Business and Professional Speaking - OC (https://catalog.louisville.edu/undergraduate/general-education-requirements/)	
ENGL 101	Introduction to College Writing - WC (https://catalog.louisville.edu/undergraduate/general-education-requirements/)	
ENGL 102	Intermediate College Writing - WC (https://catalog.louisville.edu/undergraduate/general-education-requirements/)	
ENGR 101	Engineering Analysis I - QR (https://catalog.louisville.edu/undergraduate/general-education-requirements/)	
PHYS 298	Introductory Mechanics, Heat and Sound - S (https://catalog.louisville.edu/undergraduate/general-education-requirements/)	

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 - S (https://catalog.louisville.edu/undergraduate/general-education-requirements/) [1]	3
CHEM 207	Introduction to Chemical Analysis I - SL (https://catalog.louisville.edu/undergraduate/general-education-requirements/) [1]	1
Select one of the following: [1]		3
COMM 111	Introduction to Public Speaking - OC (https://catalog.louisville.edu/undergraduate/general-education-requirements/)	
COMM 112	Business and Professional Speaking - OC (https://catalog.louisville.edu/undergraduate/general-education-requirements/)	
ENGL 101	Introduction to College Writing - WC (https://catalog.louisville.edu/undergraduate/general-education-requirements/) [1,2]	3
ENGL 102	Intermediate College Writing - WC (https://catalog.louisville.edu/undergraduate/general-education-requirements/) [1,2]	3
ENGR 101	Engineering Analysis I - QR (https://catalog.louisville.edu/undergraduate/general-education-requirements/) [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 - S (https://catalog.louisville.edu/undergraduate/general-education-requirements/) [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 - CUE (https://catalog.louisville.edu/undergraduate/general-education-requirements/)	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 543	Computer Tools for Medical Image Analysis	
BE 544	Artificial Intelligence Techniques in Digital Pathology	
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	
BE 670	Cellular Mechanobiology in Cancer	
BIOC 545	Biochemistry I	
BIOC 547	Advanced Biochemistry II	
BIOC 645	Advanced Biochemistry I	
BIOC 647	Advanced Biochemistry II	
BIOL 540	Metabolic Biochemistry	
CHEM 342	Organic Chemistry II	
CHEM 545	Biochemistry I	
CHEM 547	Biochemistry II	
CHEM 645	Advanced Biochemistry I	
CHEM 647	Advanced Biochemistry II	
ISE 430	Quality Control	
ISE 482	Quality of Care and Patient Safety	
ISE 484	Health IT and Clinician Support	
ME 422	Machine Design I	
ISE 469	Introduction to Human Factors Engineering and Ergonomics	
Bioengineering Core		
CHEM 202	General Chemistry II - S (https://catalog.louisville.edu/undergraduate/general-education-requirements/)	3
CHEM 208	Introduction to Chemical Analysis II - SL (https://catalog.louisville.edu/undergraduate/general-education-requirements/)	1
CHEM 209	Introduction to Chemical Analysis III	1
Minimum Total Hours		**53**

Code	Title	Hours
Supporting Courses		
BIOL 240	Unity of Life - S (https://catalog.louisville.edu/undergraduate/general-education-requirements/)	3
CEE 205	Mechanics I: Statics	3
CHEM 341	Organic Chemistry I	3
CHEM 343	Organic Chemistry Laboratory I	2
ISE 360	Probability and Statistics for Engineers	3
ME 206	Mechanics II: Dynamics	3
ME 251	Thermodynamics I	3
PHYS 295	Introductory Laboratories I - SL (https://catalog.louisville.edu/undergraduate/general-education-requirements/)	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 - CUE (https://catalog.louisville.edu/undergraduate/general-education-requirements/)	

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/P1/P2/SB/SBH Electives which satisfy the University-wide General Education requirements. Note that the 12-hour total for the AH/P1/P2/SB/SBH electives assumes the use of double counting of P1/P2 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 - S (https://catalog.louisville.edu/undergraduate/general-education-requirements/)	3
CHEM 207	Introduction to Chemical Analysis I - SL (https://catalog.louisville.edu/undergraduate/general-education-requirements/)	1
CHEM 208	Introduction to Chemical Analysis II - SL (https://catalog.louisville.edu/undergraduate/general-education-requirements/)	1
ENGL 101	Introduction to College Writing - WC (https://catalog.louisville.edu/undergraduate/general-education-requirements/)	3
ENGR 101	Engineering Analysis I - QR (https://catalog.louisville.edu/undergraduate/general-education-requirements/)	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 Perspectives - AHP1, SBP1, or SBHP1		3
	Hours	**17**
Spring		
BE 101	Introduction to Bioengineering	1
CHEM 202	General Chemistry II - S (https://catalog.louisville.edu/undergraduate/general-education-requirements/)	3
CHEM 209	Introduction to Chemical Analysis III	1

ENGL 102	Intermediate College Writing - WC (https://catalog.louisville.edu/undergraduate/general-education-requirements/)	3
ENGR 102	Engineering Analysis II	4
ENGR 111	Engineering Methods, Tools and Practice II	2
PHYS 298	Introductory Mechanics, Heat and Sound - S (https://catalog.louisville.edu/undergraduate/general-education-requirements/)	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 - SL (https://catalog.louisville.edu/undergraduate/general-education-requirements/)	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 - S (https://catalog.louisville.edu/undergraduate/general-education-requirements/)	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 - OC (https://catalog.louisville.edu/undergraduate/general-education-requirements/)	
COMM 112	Business and Professional Speaking - OC (https://catalog.louisville.edu/undergraduate/general-education-requirements/)	
	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
ISE 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 - CUE (https://catalog.louisville.edu/undergraduate/general-education-requirements/)	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**

The Flight Plan outlined above is intended to demonstrate one possible path to completing the degree within four years. Course selection and placement within the program may vary depending on course offerings and schedule, elective preferences, and other factors (study abroad, internship availability, etc.). Please consult your advisor for additional information about building a flight plan that works for you.

Degree Audit Report

Degree Audit reports illustrate how your completed courses fulfill the requirements of your academic plan, and which requirements are still outstanding. Degree audits also take transfer credits and test credits into account. "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.

Flight Planner

The Flight Planner tool is available for you to create a personalized Flight Plan to graduation. Advisors have access to review your Flight Planner and can help you adjust it to ensure you remain on track to graduate in a timely manner.

To create these reports:

1. Log into your ULink account.
2. Click on the Academic Progress tile.
3. Select the appropriate report.
   a. To run a Degree Audit report, click on "View my Degree Audit."
   b. To create a What-if report, click on "What-if Advisement Report."
   c. To run a Flight Planner report, click on "Use My Flight Planner."

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