

INDUSTRIAL AND SYSTEMS ENGINEERING (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 Industrial and Systems Engineering

Unit: Speed School of Engineering (<https://engineering.louisville.edu>) (SS)

Department: Industrial and Systems Engineering (<http://engineering.louisville.edu/industrial/>)

Academic Plan Code(s): IE_ _BIE

Program Information

The Bachelor of Science in Industrial and Systems Engineering degree program is accredited by the Engineering Accreditation Commission of ABET, <https://www.abet.org> (<https://www.abet.org/>), under the Commission's General Criteria and the Program Criteria for Industrial 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	65
Supporting Courses	12
Minimum Total Hours	124

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.

Accelerated BS Pathway

Industrial and Systems Engineering majors that are interested in pursuing an MS ISE or MEng EM (Online) can consider an Accelerated Pathway.

Undergraduate students interested in participating in an accelerated dual bachelor's/master's degree offered through the Soaring Scholar program must first meet with their Academic Advisor and be accepted into the program. Once accepted, students will receive an official admission letter outlining program policies and details. They will then work with their department and academic advisor to register for classes each semester, ensuring they meet the milestones and academic progress requirements of the program.

A Soaring Scholar / Accelerated Pathway student is considered an undergraduate student until their bachelor's degree is conferred. In their final undergraduate semester, they are expected to apply for admission to their respective master's program.

For more information, see the "Accelerated Pathway" 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/) ¹	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. Using other courses to satisfy General Education requirements will require additional hours to complete the degree requirements.

College/School Requirements

Code	Title	Hours
Speed School Core		
CHEM 201	General Chemistry I - S (https://catalog.louisville.edu/undergraduate/general-education-requirements/) ²	3

CHEM 207	Introduction to Chemical Analysis I - SL (https://catalog.louisville.edu/undergraduate/general-education-requirements/) ²	1
COMM 111	Introduction to Public Speaking - OC (https://catalog.louisville.edu/undergraduate/general-education-requirements/)	3
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/) ^{2,3}	3
ENGL 102	Intermediate College Writing - WC (https://catalog.louisville.edu/undergraduate/general-education-requirements/) ^{2,3}	3
ENGR 101	Engineering Analysis I - QR (https://catalog.louisville.edu/undergraduate/general-education-requirements/) ²	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/) ²	4

Minimum Total Hours 35

Program/Major Requirements

Code	Title	Hours
Industrial and Systems Engineering Department		
ISE 240	Fundamentals of Industrial Engineering	3
ISE 250	Decision Support Systems	3
ISE 288	Industrial Engineering Cooperative Education Seminar	0
ISE 289	Industrial Engineering Cooperative Education I	1
ISE 320	Manufacturing Processes	4
ISE 360	Probability and Statistics for Engineers	3
ISE 361	Decision Support Systems	3
ISE 370	Engineering Economic Analysis	3
ISE 380	Work and Systems Design	3
ISE 389	Industrial Engineering Cooperative Education II	1
ISE 419	Digital and Advanced Manufacturing Systems	3
ISE 421	Facility Location and Layout	3
ISE 425	Production and Inventory Systems	3
ISE 430	Quality Control	3
ISE 445	Systems Simulation	3
ISE 446	Operations Research Methods	3
ISE 464	Experimental Design in Engineering	3
ISE 469	Introduction to Human Factors Engineering and Ergonomics	3
ISE 489	Industrial Engineering Cooperative Education III	1
ISE 485: Systems Engineering		3
ISE 498: Capstone Design I		1

ISE 499	ISE Capstone Design - CUE (https://catalog.louisville.edu/undergraduate/general-education-requirements/)	2
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ISE Electives		6
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Industrial and Systems Engineering Core

CHEM 202	General Chemistry II - S (https://catalog.louisville.edu/undergraduate/general-education-requirements/)	3
PHYS 295	Introductory Laboratories I - SL (https://catalog.louisville.edu/undergraduate/general-education-requirements/)	1

Minimum Total Hours		65
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Code	Title	Hours
Supporting Courses		

CEE 205	Mechanics I: Statics	3
ECE 252	Introduction to Electrical Engineering	3
ME 251	Thermodynamics I	3
ENGR 151	Engineering Graphics Technology	1
ENGR 307	Numerical Methods for Engineering	2

Minimum Total Hours		12
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A student may accumulate no more than two D-minus, D, or D+ grades in ISE prefixed courses to graduate with a baccalaureate degree. For any additional D-minus, D, or D+ grades beyond two, the student must repeat the course to earn a better grade.

Candidates for the Bachelor of Science degree must be in good standing (university GPA ≥ 2.25) and must attain a GPA 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:

ISE 499	ISE Capstone Design - CUE (https://catalog.louisville.edu/undergraduate/general-education-requirements/)	
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¹ 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.

² This course is a General Education requirement for the program; see [louisville.edu/provost/ger/](http://www.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.

³ 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.

Flight Plan

Year 1		
Fall		Hours
CHEM 101	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
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 Perspective US Perspectives - AHP1, SBP1, or SBHP1		3
Hours		16

Spring		
CHEM 202	General Chemistry II - S (https://catalog.louisville.edu/undergraduate/general-education-requirements/)	3
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 295	Introductory Laboratories I - SL (https://catalog.louisville.edu/undergraduate/general-education-requirements/)	1
PHYS 298	Introductory Mechanics, Heat and Sound - S (https://catalog.louisville.edu/undergraduate/general-education-requirements/)	4
Hours		17

Summer		
ENGR 151	Engineering Graphics Technology	1
ENGR 201	Engineering Analysis III	4
CEE 205	Mechanics I: Statics	3
COMM 111 or COMM 112	Introduction to Public Speaking - OC (https://catalog.louisville.edu/undergraduate/general-education-requirements/) or Business and Professional Speaking - OC (https://catalog.louisville.edu/undergraduate/general-education-requirements/)	3
Hours		11

Year 2		
Fall		
ENGR 205	Differential Equations for Engineering	2
ISE 240	Fundamentals of Industrial Engineering	3
ISE 250	Decision Support Systems	3
ISE 288	Industrial Engineering Cooperative Education Seminar	0
ISE 320	Manufacturing Processes	4
ISE 380	Work and Systems Design	3
General Education: Cardinal Core Arts & Humanities, Social & Behavioral Sciences, or Social & Behavioral Sciences Historical Perspective - AH, SB, or SBH		3
Hours		18

Spring		
ISE 289	Industrial Engineering Cooperative Education I	1
Hours		1
Summer		
ECE 252	Introduction to Electrical Engineering	3
ME 251	Thermodynamics I	3
ISE 360	Probability and Statistics for Engineers	3
ISE 370	Engineering Economic Analysis	3
Hours		12

Year 3		
Fall		
ISE 389	Industrial Engineering Cooperative Education II	1
Hours		1

Spring		
ISE 361	Decision Support Systems	3
ISE 419	Digital and Advanced Manufacturing Systems	3
ISE 445	Systems Simulation	3
ISE 469	Introduction to Human Factors Engineering and Ergonomics	3
ENGR 307	Numerical Methods for Engineering	2
General Education: Cardinal Core Arts & Humanities, Social & Behavioral Sciences, or Social & Behavioral Sciences Historical Perspective - AH, SB, or SBH		3
Hours		17
Summer		
ISE 489	Industrial Engineering Cooperative Education III	1
Hours		1
Year 4		
Fall		
ISE 421	Facility Location and Layout	3
ISE 446	Operations Research Methods	3
ISE 425	Production and Inventory Systems	3
Industrial and Systems Engineering Elective (4xx/5xx) ¹		3
ISE 485: Systems Engineering		3
ISE 498: Capstone Design I		1
Hours		16
Spring		
ISE 499	ISE Capstone Design - CUE (https://catalog.louisville.edu/undergraduate/general-education-requirements/)	2
ISE 464	Experimental Design in Engineering	3
ISE 430	Quality Control	3
Industrial and Systems Engineering Elective (4xx/5xx) ¹		3
General Education: Cardinal Core Arts & Humanities, Social & Behavioral Sciences, or Social & Behavioral Sciences Historical Perspective - AH, SB, or SBH		3
Hours		14
Minimum Total Hours		124

¹ Courses outside of the Industrial and Systems Engineering Department may be used to meet the "Industrial and Systems Engineering Elective (4xx/5xx)" requirements upon approval of the Department.

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>)

Accelerated Program Participants

Students accepted into an Accelerated Pathway may substitute select Graduate-level courses for equivalent Undergraduate courses as discussed with their Graduate Program Advisor.

Accelerated BS-MSISE and BS-MEEMO Pathways

Industrial and Systems Engineering majors that are interested in pursuing an MS ISE or MEng EM (Online) can consider an Accelerated Pathway. The Accelerated Pathway allows 12 credit hours of graduate coursework to be counted towards both degrees, speeding up the timeline for overall completion.

Students may apply as early as Summer 2 of the BS ISE given they meet the following criteria:

- Completion of 60+ credit hours towards BS ISE degree
- Completion of 10+ credit hours in ISE coursework
- Current enrollment in, or previous completion of ISE 360
- GPA of 3.3 or above

Applications are available in the Department of Industrial and Systems Engineering, JB Speed Building Room 304, or online at engineering.louisville.edu/academics/departments/industrial (<https://engineering.louisville.edu/academics/departments/industrial/>). Students who are admitted to the Accelerated Pathway and wish to complete the MSISE or MEEMO degree, should formally submit an application for the Master's Program of their choosing, to the Graduate School in their final undergraduate semester of the BSISE degree.

Program Requirements: BSMSISE

Sample course recommendations for the 12 graduate credit hours taken during the undergraduate BSISE program are provided in the table below for four focus areas within the MSISE program. Other courses may be selected with approval from the program advisor.

Code	Title	Hours
<i>Focus Area: Research</i>		12
ISE 664	Experimental Design in Engineering	
ISE 646	Operations Research Methods	
ISE 561	Decision Support Systems	
ISE 645	Systems Simulation	
<i>Focus Area: Advanced Manufacturing</i>		12
ISE 664	Experimental Design in Engineering	
ISE 600	Additive Manufacturing Processes	
ISE 629	Quality Control	
IE 5XX	Industry Automation	
<i>Focus Area: Supply Chain and Logistics</i>		12

ISE 664	Experimental Design in Engineering
ISE 621	Facility Location and Layout
ISE 625	Production and Inventory Systems
ISE 646	Operations Research Methods
<i>Focus Area: Human Factors</i>	
	<i>12</i>
ISE 664	Experimental Design in Engineering
ISE 669	Introduction to Human Factors Engineering and Ergonomics
ISE 671	Advanced Topics in Human Factors Engineering
ISE 675	Usability Engineering

Program Requirements: BSMEEMO

Students in the BSMEEMO accelerated pathway should plan to take the four courses (12 credit hours) for graduate credit listed below during the undergraduate BSISE program; two of these courses will replace BSISE program requirements, and two courses will count as BSISE program electives.

Code	Title	Hours
ISE 664	Experimental Design in Engineering ¹	3
ISE 629	Quality Control ²	3
ISE 525	Project Management ³	3
or EM 525	Project Management	
EM 645	Decision and Risk Analysis ³	3

¹ Replaces ISE 464 in the BSISE program requirements.

² Replaces ISE 430 in the BSISE program requirements.

³ Counts as an elective in the BSISE program.