This program was approved for students entering the university in the Summer 2024–Spring 2025 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 Electrical Engineering
Unit: Speed School of Engineering (https://engineering.louisville.edu/) (SS)
Department: Electrical & Computer Engineering (http://engineering.louisville.edu/electrical/)
Academic Plan Code(s): EE_BEE

Program Information
The Bachelor of Science in Electrical Engineering 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 Electrical, Computer, Communications, Telecommunication(s), 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

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>General Education Requirements (<a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a>)</td>
<td>31</td>
</tr>
</tbody>
</table>

(19 hours of General Education requirements may be satisfied through coursework required by the degree program)

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) OR MATH 190 (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

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>General Education Requirements (<a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a>)</td>
<td>31</td>
</tr>
</tbody>
</table>

The following courses are required by the program and satisfy the respective General Education Requirement(s):
CHEM 201 General Chemistry I - S (http://catalog.louisville.edu/undergraduate/general-education-requirements/) 3

CHEM 207 Introduction to Chemical Analysis I - SL (http://catalog.louisville.edu/undergraduate/general-education-requirements/) 1

COMM 111 Introduction to Public Speaking - OC (http://catalog.louisville.edu/undergraduate/general-education-requirements/) 3

or COMM 112 Business and Professional Speaking - OC (http://catalog.louisville.edu/undergraduate/general-education-requirements/) 3

ENGL 101 Introduction to College Writing - WC (http://catalog.louisville.edu/undergraduate/general-education-requirements/) 3

ENGL 102 Intermediate College Writing - WC (http://catalog.louisville.edu/undergraduate/general-education-requirements/) 1

ENGR 101 Engineering Analysis I - QR (http://catalog.louisville.edu/undergraduate/general-education-requirements/) 4

PHYS 298 Introductory Mechanics, Heat and Sound - S (http://catalog.louisville.edu/undergraduate/general-education-requirements/) 4

**Minimum Total Hours**

35

### Program/Major Requirements

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE 220</td>
<td>Network Analysis I</td>
<td>3</td>
</tr>
<tr>
<td>ECE 228</td>
<td>Electrical &amp; Computer Engineering Cooperative Education Seminar</td>
<td>0</td>
</tr>
<tr>
<td>ECE 289</td>
<td>Electrical &amp; Computer Engineering Cooperative Education I</td>
<td>1</td>
</tr>
<tr>
<td>ECE 320</td>
<td>Network Analysis II</td>
<td>3</td>
</tr>
<tr>
<td>ECE 322</td>
<td>Introduction to ECE Computing Tools</td>
<td>1</td>
</tr>
<tr>
<td>ECE 333</td>
<td>Electronics I</td>
<td>3</td>
</tr>
<tr>
<td>ECE 334</td>
<td>Electronics I Lab</td>
<td>1</td>
</tr>
<tr>
<td>ECE 360</td>
<td>Probabilistic Methods in Electrical and Computer Engineering</td>
<td>3</td>
</tr>
<tr>
<td>ECE 389</td>
<td>Electrical &amp; Computer Engineering Cooperative Education II</td>
<td>1</td>
</tr>
<tr>
<td>ECE/CSE 412</td>
<td>Introduction to Embedded Systems</td>
<td>3</td>
</tr>
<tr>
<td>ECE 420</td>
<td>Signals and Linear Systems</td>
<td>3</td>
</tr>
<tr>
<td>ECE 473</td>
<td>Introduction to Electromagnetic Fields and Waves</td>
<td>3</td>
</tr>
<tr>
<td>ECE 489</td>
<td>Electrical and Computer Engineering Cooperative Education III</td>
<td>1</td>
</tr>
<tr>
<td>ECE 496</td>
<td>Professional Issues and Current Topics Seminar</td>
<td>2</td>
</tr>
<tr>
<td>ECE 497</td>
<td>Capstone Design in ECE - CUE (<a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a>) (CUE)</td>
<td>3</td>
</tr>
<tr>
<td>ECE Elective Lecture &amp; Lab. Select two of the following pairs:</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>ECE 510</td>
<td>Computer Design</td>
<td></td>
</tr>
<tr>
<td>&amp; ECE 511</td>
<td>Computer Design Laboratory</td>
<td></td>
</tr>
<tr>
<td>ECE 515</td>
<td>Introduction to VLSI Systems</td>
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<tr>
<td>&amp; ECE 514</td>
<td>Introduction to VLSI Systems Laboratory</td>
<td></td>
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<tr>
<td>ECE 516</td>
<td>Microcomputer Design</td>
<td></td>
</tr>
<tr>
<td>CSE 525</td>
<td>Microcomputer Design</td>
<td></td>
</tr>
<tr>
<td>ECE 520</td>
<td>Digital Signal Processing</td>
<td></td>
</tr>
<tr>
<td>&amp; ECE 521</td>
<td>Digital Signal Processing Laboratory</td>
<td></td>
</tr>
<tr>
<td>ECE 533</td>
<td>Integrated Circuit Design</td>
<td></td>
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<tr>
<td>&amp; ECE 534</td>
<td>Integrated Circuit Design Laboratory</td>
<td></td>
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<tr>
<td>ECE 543</td>
<td>Fundamentals of Microfabrication and MEMS</td>
<td></td>
</tr>
<tr>
<td>&amp; ECE 544</td>
<td>Microfabrications/MEMS Laboratory</td>
<td></td>
</tr>
<tr>
<td>ECE 550</td>
<td>Communication and Modulation</td>
<td></td>
</tr>
<tr>
<td>&amp; ECE 551</td>
<td>Communication Systems Laboratory</td>
<td></td>
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<tr>
<td>ECE 555</td>
<td>Digital Image Processing</td>
<td></td>
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<tr>
<td>&amp; ECE 556</td>
<td>Digital Image Processing Laboratory</td>
<td></td>
</tr>
<tr>
<td>ECE 560</td>
<td>Control Systems Principles</td>
<td></td>
</tr>
<tr>
<td>&amp; ECE 561</td>
<td>Control Systems Laboratory</td>
<td></td>
</tr>
</tbody>
</table>
Select two ECE Electives at the 500 level from the following:

- ECE 525 Microcomputer Design
- ECE 531 Power Electronics
- ECE 533 Integrated Circuit Design
- ECE 542 Semiconductor Device Fundamentals
- ECE 543 Fundamentals of Microfabrication and MEMS
- ECE 544 Microfabrications/MEMS Laboratory
- ECE 545 Optical Signal Processing
- ECE 550 Communication and Modulation
- ECE 551 Communication Systems Laboratory
- ECE 555 Digital Image Processing
- ECE 556 Digital Image Processing Laboratory
- ECE 560 Control Systems Principles
- ECE 561 Control Systems Laboratory
- ECE 564 Fundamentals of Autonomous Robots
- ECE 565 Fundamentals of Autonomous Robots Lab
- ECE 569 Intermediate Electromagnetic Fields and Waves
- ECE 581 Electric Machines and Drives
- ECE 582 Power System Analysis
- CSE 516 Fundamentals of Computer Communications and Networks
- CSE 525 Microcomputer Design

Electrical and Computer Engineering Core

- ECE 210 Logic Design
- ECE 211 Logic Design Laboratory

Minimum Total Hours 50

Code Supporting Courses Title Hours
CSE 130 Introduction to C and C++ Programming Languages 3
IE 370 Engineering Economic Analysis 3
ENGR 330 Linear Algebra for Engineering 2
PHYS 295 Introductory Laboratories I - SL (http://catalog.louisville.edu/undergraduate/general-education-requirements/) 1
PHYS 296 Introductory Laboratories II - SL (http://catalog.louisville.edu/undergraduate/general-education-requirements/) 1

Select one CSE/Mathematics/Science Elective from the following:

- BIOL 240 Unity of Life - S (http://catalog.louisville.edu/undergraduate/general-education-requirements/)
- BIOL 242 Diversity of Life - S (http://catalog.louisville.edu/undergraduate/general-education-requirements/)
- BIOL 263 Environmental Biology - B (http://catalog.louisville.edu/undergraduate/general-education-requirements/)
- CSE 220 Object Oriented Program Design with Java
- CSE 302 Data Structures
- CSE 310 Discrete Structures
- CSE 420 Design of Operating Systems
- CHEM 202 General Chemistry II - S (http://catalog.louisville.edu/undergraduate/general-education-requirements/)
- PHYS 220 Introduction to Weather and Climate - S (http://catalog.louisville.edu/undergraduate/general-education-requirements/)
- or ENVS 220 Introduction to Weather and Climate - S (http://catalog.louisville.edu/undergraduate/general-education-requirements/)
- ENVS 301 Geology for Scientists and Engineers
- MATH 311 Introduction to Higher Math
- MATH 387 Discrete Mathematics
- MATH 501 Introduction to Analysis I - CUE (http://catalog.louisville.edu/undergraduate/general-education-requirements/)
- MATH 507 Fourier Analysis
- MATH 581 Introduction to Graph Theory
- PHYS 300 Introductory Modern Physics
- PHYS 307 Introductory Stellar Astrophysics
- PHYS 355 Optics
- PHYS 361 Thermodynamic Meteorology
- PHYS 460 Mechanics

Select one Engineering Science Elective from the following: 3

- CSE 220 Object Oriented Program Design with Java
- CSE 302 Data Structures
- CSE 310 Discrete Structures
- CSE 420 Design of Operating Systems
- CEE 205 Mechanics I: Statics
- CHE 253 Materials Science
- IE 446 Operations Research Methods
- ME 206 Mechanics II: Dynamics
- ME 251 Thermodynamics I

Select two additional courses from either the CSE/Mathematics/Science Electives list, or the ECE Electives List 3

Minimum Total Hours 26

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.
Culminating Undergraduate Experience (Graduation requirement)

Requirement fulfilled by completing:

- **ECE 497** Capstone Design in ECE - CUE (http://catalog.louisville.edu/undergraduate/general-education-requirements/)

1. This course is a General Education requirement for the program; see 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. The Department recommends COMM 112 over COMM 111.

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. ENGL 303 or ENGL 306 is recommended as the additional course for EE students.

3. Students must take 3 hours of CSE/Mathematics/Science Electives and 3 hours of Engineering Science Electives. Some students may wish to use these electives toward satisfying the requirements for a minor in Mathematics or Physics; additional information is available in the Department. 6 additional hours must be taken of either CSE/Mathematics/Science Electives or ECE Electives.

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**Flight Plan**

**Year 1**

**Fall**

- **CHEM 201** General Chemistry I - S (http://catalog.louisville.edu/undergraduate/general-education-requirements/) 3
- **CHEM 207** Introduction to Chemical Analysis I - SL (http://catalog.louisville.edu/undergraduate/general-education-requirements/) 1
- **ENGL 101** Introduction to College Writing - WC (http://catalog.louisville.edu/undergraduate/general-education-requirements/) 3
- **ENGR 101** Engineering Analysis I - QR (http://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 - AH, SB, or SBH** 3

**Spring**

- **ECE 210** Logic Design 3
- **ECE 211** Logic Design Laboratory 1
- **ENGL 102** Intermediate College Writing - WC (http://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 (http://catalog.louisville.edu/undergraduate/general-education-requirements/) 4

**Year 2**

**Fall**

- **CSE 130** Introduction to C and C++ Programming Languages 3
- **COMM 112** or **COMM 111** Business and Professional Speaking - OC (http://catalog.louisville.edu/undergraduate/general-education-requirements/) 3
- **ECE 220** Network Analysis I 3
- **ECE 221** Network Analysis I Laboratory 1
- **ECE 288** Electrical & Computer Engineering Cooperative Education Seminar 0
- **ECE 322** Introduction to ECE Computing Tools 1
- **ENGR 205** Differential Equations for Engineering 2
- **General Education: Cardinal Core Arts & Humanities, Social & Behavioral Sciences, or Social & Behavioral Sciences Historical Persepective Global Diversity - AHD2, SBH, or SBH** 3

**Spring**

- **ECE 289** Electrical & Computer Engineering Cooperative Education I 1

**Summer**

- **IE 370** Engineering Economic Analysis 3
- **ECE 320** Network Analysis II 3
- **Engineering Science Elective** 3
- **ECE 473** Introduction to Electromagnetic Fields and Waves 3

**Year 3**

**Fall**

- **ECE 389** Electrical & Computer Engineering Cooperative Education II 1

**Summer**

- **CSE/Math/Science Elective or ECE Elective** 3
- **ECE 333** Electronics I 3
- **ECE 334** Electronics I Lab 1
- **ECE 360** Probabilistic Methods in Electrical and Computer Engineering 3
- **ECE 420** Signals and Linear Systems 3
- **ENGR 330** Linear Algebra for Engineering 2

**Year 4**

**Fall**

- **ECE 412** Introduction to Embedded Systems or **CSE 412** Introduction to Embedded Systems 3
- **CSE/Math/Science Elective or ECE Elective** 3
- **Electrical & Computer Engineering Elective (500 level)** 3
- **Electrical & Computer Engineering Elective (500 level)** 3
- **ECE 496** Professional Issues and Current Topics Seminar 2
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:**

a. Log into your ULink account.

b. Click on the Academic Progress tile.

c. Select the appropriate report.

   i. To run a Degree Audit report, click on "View my Degree Audit."

   ii. To create a What-if report, click on "Create a What-if Advisement Report."

   iii. 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)