ELECTRICAL ENGINEERING (BS)

This program was approved for students entering the university in the Summer 2019–Spring 2020 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 (SS) (https://engineering.louisville.edu)
Department: Electrical & Computer Engineering (http://engineering.louisville.edu/electrical)
Academic Plan Code(s): EE_ _BEE

Program Information
Students specializing in Electrical Engineering will complete a program consisting of two semesters in Engineering Fundamentals and a further period of study in the Department of Electrical & Computer Engineering—nine semesters in Departmental Studies—to complete the Bachelor of Science degree, followed by a fifth year in Graduate Studies for the Master of Engineering degree. This curriculum is designed as an integrated five-year program, with a cooperative education component, culminating in the Master of Engineering degree.


Degree Summary

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.

Departmental Admission Requirements
Acceptance into a Department requires that a student have a 2.25 GPA in the prescribed set of courses totaling 30 semester hours in Engineering Fundamentals. In addition, the student must be in good standing (university GPA ≥ 2.25).

General Education Requirements

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 201</td>
<td>General Chemistry I - S</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 207</td>
<td>Introduction to Chemical Analysis I - SL</td>
<td>3</td>
</tr>
<tr>
<td>COMM 111</td>
<td>Introduction to Public Speaking - OC</td>
<td>3</td>
</tr>
<tr>
<td>or COMM 112</td>
<td>Business and Professional Speaking - OC</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 101</td>
<td>Introduction to College Writing - WC</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 102</td>
<td>Intermediate College Writing - WC</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 101</td>
<td>Engineering Analysis I - QR</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 298</td>
<td>Introductory Mechanics, Heat and Sound - S</td>
<td>4</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 201</td>
<td>General Chemistry I - S</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 207</td>
<td>Introduction to Chemical Analysis I - SL</td>
<td>3</td>
</tr>
<tr>
<td>COMM 111</td>
<td>Introduction to Public Speaking - OC</td>
<td>3</td>
</tr>
<tr>
<td>or COMM 112</td>
<td>Business and Professional Speaking - OC</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 101</td>
<td>Introduction to College Writing - WC</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 102</td>
<td>Intermediate College Writing - WC</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 101</td>
<td>Engineering Analysis I - QR</td>
<td>4</td>
</tr>
<tr>
<td>ENGR 102</td>
<td>Engineering Analysis II</td>
<td>4</td>
</tr>
<tr>
<td>ENGR 110</td>
<td>Engineering Methods, Tools, and Practice I</td>
<td>2</td>
</tr>
<tr>
<td>ENGR 111</td>
<td>Engineering Methods, Tools and Practice II</td>
<td>2</td>
</tr>
<tr>
<td>PHYS 298</td>
<td>Introductory Mechanics, Heat and Sound - S</td>
<td>4</td>
</tr>
</tbody>
</table>

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.
Program/Major Requirements

**Electrical and Computer Engineering Department 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 221</td>
<td>Network Analysis I Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>ECE 288</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/CECS 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 I</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 (CUE)</td>
<td>3</td>
</tr>
<tr>
<td>ECE Elective Lecture &amp; Lab.</td>
<td>Select two of the following pairs:</td>
<td>8</td>
</tr>
<tr>
<td>ECE 510 &amp; ECE 511</td>
<td>Computer Design &amp; Computer Design Laboratory</td>
<td></td>
</tr>
<tr>
<td>ECE 515 &amp; ECE 514</td>
<td>Introduction to VLSI Systems &amp; Introduction to VLSI Systems Laboratory</td>
<td></td>
</tr>
<tr>
<td>ECE 516</td>
<td>Microcomputer Design</td>
<td></td>
</tr>
<tr>
<td>CECS 525</td>
<td>Microcomputer Design</td>
<td></td>
</tr>
<tr>
<td>ECE 520 &amp; ECE 521</td>
<td>Digital Signal Processing &amp; Digital Signal Processing Laboratory</td>
<td></td>
</tr>
<tr>
<td>ECE 533 &amp; ECE 534</td>
<td>Integrated Circuit Design &amp; Integrated Circuit Design Laboratory</td>
<td></td>
</tr>
<tr>
<td>ECE 543 &amp; ECE 544</td>
<td>Fundamentals of Microfabrication and MEMS &amp; Microfabrications/MEMS Laboratory</td>
<td></td>
</tr>
<tr>
<td>ECE 550 &amp; ECE 551</td>
<td>Communication and Modulation &amp; Communication Systems Laboratory</td>
<td></td>
</tr>
<tr>
<td>ECE 560 &amp; ECE 561</td>
<td>Control Systems Principles &amp; Control Systems Laboratory</td>
<td></td>
</tr>
<tr>
<td>Select two ECE Electives at the 500 level from the following:</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>ECE 500</td>
<td>Special Topics in Electrical Engineering</td>
<td></td>
</tr>
<tr>
<td>ECE 510</td>
<td>Computer Design</td>
<td></td>
</tr>
<tr>
<td>ECE 511</td>
<td>Computer Design Laboratory</td>
<td></td>
</tr>
<tr>
<td>ECE 514</td>
<td>Introduction to VLSI Systems Laboratory</td>
<td></td>
</tr>
<tr>
<td>ECE 515</td>
<td>Introduction to VLSI Systems</td>
<td></td>
</tr>
<tr>
<td>ECE 516</td>
<td>Microcomputer Design</td>
<td></td>
</tr>
<tr>
<td>ECE 518</td>
<td>Fundamentals of Computer Communications and Networks</td>
<td></td>
</tr>
<tr>
<td>ECE 520</td>
<td>Digital Signal Processing</td>
<td></td>
</tr>
<tr>
<td>ECE 521</td>
<td>Digital Signal Processing Laboratory</td>
<td></td>
</tr>
<tr>
<td>ECE 523</td>
<td>Introduction to Biometrics</td>
<td></td>
</tr>
<tr>
<td>ECE 530</td>
<td>Introduction to Random Processes and Estimation Theory</td>
<td></td>
</tr>
<tr>
<td>ECE 531</td>
<td>Power Electronics</td>
<td></td>
</tr>
<tr>
<td>ECE 533</td>
<td>Integrated Circuit Design</td>
<td></td>
</tr>
<tr>
<td>ECE 534</td>
<td>Integrated Circuit Design Laboratory</td>
<td></td>
</tr>
<tr>
<td>ECE 542</td>
<td>Semiconductor Device Fundamentals</td>
<td></td>
</tr>
<tr>
<td>ECE 543</td>
<td>Fundamentals of Microfabrication and MEMS Laboratory</td>
<td></td>
</tr>
<tr>
<td>ECE 544</td>
<td>Microfabrications/MEMS Laboratory</td>
<td></td>
</tr>
<tr>
<td>ECE 545</td>
<td>Optical Signal Processing</td>
<td></td>
</tr>
<tr>
<td>ECE 550</td>
<td>Communication and Modulation</td>
<td></td>
</tr>
<tr>
<td>ECE 551</td>
<td>Communication Systems Laboratory</td>
<td></td>
</tr>
<tr>
<td>ECE 560</td>
<td>Control Systems Principles</td>
<td></td>
</tr>
<tr>
<td>ECE 561</td>
<td>Control Systems Laboratory</td>
<td></td>
</tr>
<tr>
<td>ECE 564</td>
<td>Fundamentals of Autonomous Robots</td>
<td></td>
</tr>
<tr>
<td>ECE 565</td>
<td>Fundamentals of Autonomous Robots Lab</td>
<td></td>
</tr>
<tr>
<td>ECE 581</td>
<td>Electric Machines and Drives</td>
<td></td>
</tr>
<tr>
<td>ECE 582</td>
<td>Power System Analysis</td>
<td></td>
</tr>
<tr>
<td>CECS 516</td>
<td>Fundamentals of Computer Communications and Networks</td>
<td></td>
</tr>
<tr>
<td>CECS 525</td>
<td>Microcomputer Design</td>
<td></td>
</tr>
<tr>
<td>CECS 528</td>
<td>Microcomputer Design</td>
<td></td>
</tr>
</tbody>
</table>

**Electrical and Computer Engineering Core**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE 210</td>
<td>Logic Design</td>
<td>3</td>
</tr>
<tr>
<td>ECE 211</td>
<td>Logic Design Laboratory</td>
<td>1</td>
</tr>
</tbody>
</table>

**Supporting Courses**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CECS 130</td>
<td>Introduction to Programming Languages</td>
<td>3</td>
</tr>
<tr>
<td>IE 370</td>
<td>Engineering Economic Analysis</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 295</td>
<td>Introductory Laboratories I - SL</td>
<td>1</td>
</tr>
<tr>
<td>PHYS 296</td>
<td>Introductory Laboratories II - SL</td>
<td>1</td>
</tr>
<tr>
<td>PHYS 299</td>
<td>Introductory Electricity, Magnetism and Light</td>
<td>4</td>
</tr>
<tr>
<td>Select one CECS/Mathematics/Science Elective from the following:</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BIOL 240</td>
<td>Unity of Life - S</td>
<td></td>
</tr>
<tr>
<td>BIOL 242</td>
<td>Diversity of Life - S</td>
<td></td>
</tr>
<tr>
<td>BIOL 263</td>
<td>Environmental Biology - B</td>
<td></td>
</tr>
<tr>
<td>CECS 220</td>
<td>Object Oriented Program Design with Java</td>
<td></td>
</tr>
<tr>
<td>CECS 310</td>
<td>Discrete Structures</td>
<td></td>
</tr>
<tr>
<td>CHEM 202</td>
<td>General Chemistry II - S</td>
<td></td>
</tr>
<tr>
<td>PHYS/GEOS 220</td>
<td>Contemporary Issues in Meteorology - S</td>
<td></td>
</tr>
<tr>
<td>GEOS 301</td>
<td>Geology for Scientists and Engineers</td>
<td></td>
</tr>
<tr>
<td>MATH 311</td>
<td>Introduction to Higher Math</td>
<td></td>
</tr>
<tr>
<td>MATH 387</td>
<td>Discrete Mathematics</td>
<td></td>
</tr>
<tr>
<td>MATH 501</td>
<td>Introduction to Analysis I - CUE</td>
<td></td>
</tr>
<tr>
<td>MATH 507</td>
<td>Fourier Analysis</td>
<td></td>
</tr>
<tr>
<td>MATH 581</td>
<td>Introduction to Graph Theory</td>
<td></td>
</tr>
<tr>
<td>PHYS 300</td>
<td>Introductory Modern Physics</td>
<td></td>
</tr>
<tr>
<td>PHYS 307</td>
<td>Introductory Stellar Astrophysics</td>
<td></td>
</tr>
<tr>
<td>PHYS 355</td>
<td>Optics</td>
<td></td>
</tr>
<tr>
<td>PHYS 361</td>
<td>Atmospheric Thermodynamics</td>
<td></td>
</tr>
</tbody>
</table>
The Flight Plan is designed to outline the academic journey for students pursuing a Bachelor of Science degree in Electrical Engineering at the University of Louisville. It is structured for three academic years, detailed with specific courses, titles, credit hours, and other requirements. The plan includes mandatory courses such as Mechanics, Data Structures, and Discrete Structures, along with electives and requirements for good standing. Each year is divided into semesters with a clear mapping of courses, ensuring that students meet all degree requirements. The plan also highlights the importance of maintaining a minimum GPA, with a requirement of at least 2.25 for all courses used to satisfy degree requirements. Additional electives are recommended to provide a well-rounded education, meeting the diverse needs of students.
<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summer</td>
<td>ECE 489</td>
<td>Electrical and Computer Engineering Cooperative Education III</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hours</td>
<td>1</td>
</tr>
<tr>
<td>Year 4</td>
<td></td>
<td>ECE 412, or CECS 412 (Introduction to Embedded Systems)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>or CECS 412 (Introduction to Embedded Systems)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>CECS/Math/Science Elective or ECE Elective</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Electrical &amp; Computer Engineering Elective (500 level)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Electrical &amp; Computer Engineering Elective (500 level)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ECE 496 Professional Issues and Current Topics Seminar</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CECS/Science Elective</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total Hours</td>
<td>17</td>
</tr>
<tr>
<td>Spring</td>
<td>ECE 497</td>
<td>Capstone Design in ECE - CUE</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Electrical &amp; Computer Engineering Elective (500 level)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Electrical &amp; Computer Engineering Elective Lab (500 level)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Electrical &amp; Computer Engineering Design Elective (500 level)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Electrical &amp; Computer Engineering Design Elective Lab (500 level)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>General Education: Cardinal Core Arts &amp; Humanities, Social &amp; Behavioral Sciences, or Social &amp; Behavioral Sciences Historical Perspective US Diversity - AHD1, SBD1, or SBHD1</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total Hours</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Minimum Total Hours</td>
<td>123</td>
</tr>
</tbody>
</table>

**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 Student Services tab.
3. Next, click on "View my Academic Advisement Report" 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.