ELECTRICAL ENGINEERING, B.S.

As an electrical engineering major, you can learn to design, develop, analyze, research and create systems for a wide variety of fields, including power generation, communication, healthcare and instrumentation. You’ll also learn about the devices and components that make up these systems—from the smallest transistors (of which there can be hundreds of billions on a single chip!) to antennas, lasers, electric engines and even fusion devices that could provide power for the world.

Electrical engineering majors learn the tools for analyzing and operating systems, including signal processing, control and machine learning. You can even focus on the mathematics, tools and practices associated with machine learning and data science in engineering with our new Machine Learning and Data Science named degree option. In the UW–Madison ECE department, our program will match your ambition.

ELECTRICAL ENGINEERING AND COMPUTER ENGINEERING PROGRAM EDUCATIONAL OBJECTIVES

Our graduates should be engaged in activities such as:

1. Employment in industry, government, academia, or nonprofit using their degree knowledge or skills for professional functions such as teaching, research and development, quality control, technical marketing, intellectual property management, or sales. Graduates may eventually reach a leadership position supervising others.
2. Continuing education through self-study or short courses and workshops through their employer, local or online educational institutions, or attendance at professional events such as conferences.
3. Taking a principal role in starting a new business or product line.
4. Pursuing a postgraduate degree.

HOW TO GET IN

ADMISSION TO THE COLLEGE AS A FRESHMAN

Students applying to UW–Madison (https://www.admissions.wisc.edu/apply/) need to indicate an engineering major (https://engineering.wisc.edu/degrees-programs/undergraduate/) as their first choice in order to be considered for direct admission to the College of Engineering. Direct admission to a major means students will start in the program of their choice in the College of Engineering and will need to meet progression requirements (https://engineering.wisc.edu/student-services/undergraduate-student-advising/progression/) at the end of the first year to guarantee advancement in that program.

CROSS-CAMPUS TRANSFER TO ENGINEERING

UW–Madison students in other schools and colleges on campus must meet minimum admission requirements (https://engineering.wisc.edu/admissions/undergraduate/cross-campus-students/) for admission consideration to engineering degree granting classifications. Cross-campus admission is competitive and selective, and the grade point average expectations may increase as demand trends change. The student’s overall academic record at UW–Madison is also considered.

Students apply to their intended engineering program by submitting the online application by stated deadlines for spring and fall. The College of Engineering offers an online information tutorial and drop-in advising (https://engineering.wisc.edu/admissions/undergraduate/cross-campus-students/) for students to learn about the cross-campus transfer process.

OFF-CAMPUS TRANSFER TO ENGINEERING

With careful planning, students at other accredited institutions can transfer coursework that will apply toward engineering degree requirements at UW–Madison. Off-campus transfer applicants are considered for direct admission to the College of Engineering by applying to the Office of Admissions with an engineering major listed as their first choice. Those who are admitted to their intended engineering program must meet progression requirements (https://engineering.wisc.edu/admissions/undergraduate/transfer-from-off-campus/) at the point of transfer or within their first two semesters at UW–Madison to guarantee advancement in that program. A minimum of 30 credits in residence in the College of Engineering is required after transferring, and all students must meet all requirements for their major in the college. Transfer admission to the College of Engineering is competitive and selective, and students who have exceeded the 80 credit limit at the time of application are not eligible to apply.

The College of Engineering has dual degree programs with select four-year UW System campuses. Eligible dual degree applicants are not subject to the 80 credit limit.

Off-campus transfer students are encouraged to discuss their interests, academic background, and admission options with the Transfer Coordinator in the College of Engineering: ugtransfer@engr.wisc.edu or 608-262-2473.

SECOND BACHELOR’S DEGREE

The College of Engineering does not accept second undergraduate degree applications. Second degree students (https://engineering.wisc.edu/admissions/undergraduate/adult-students-second-degree-students/https://engineering.wisc.edu/student-services/undergraduate-student-advising/) might explore the Biological Systems Engineering program at UW–Madison, an undergraduate engineering degree elsewhere, or a graduate program in the College of Engineering.

REQUIREMENTS

UNIVERSITY GENERAL EDUCATION REQUIREMENTS

All undergraduate students at the University of Wisconsin–Madison are required to fulfill a minimum set of common university general education requirements to ensure that every graduate acquires the essential core of an undergraduate education. This core establishes a foundation for living a productive life, being a citizen of the world, appreciating aesthetic values, and engaging in lifelong learning in a continually changing world. Various schools and colleges will have requirements in addition to the requirements listed below. Consult your advisor for assistance, as needed. For additional information, see the university Undergraduate General Education Requirements (http://guide.wisc.edu/undergraduate/#requirementsforundergraduatestudiotype) section of the Guide.
General Education

- Breadth—Humanities/Literature/Arts: 6 credits
- Breadth—Natural Science: 4 to 6 credits, consisting of one 4- or 5-credit course with a laboratory component; or two courses providing a total of 6 credits
- Breadth—Social Studies: 3 credits
- Communication Part A & Part B *
- Ethnic Studies *
- Quantitative Reasoning Part A & Part B *

* The mortarboard symbol appears before the title of any course that fulfills one of the Communication Part A or Part B, Ethnic Studies, or Quantitative Reasoning Part A or Part B requirements.

SUMMARY OF REQUIREMENTS

The following curriculum applies to students who were admitted to the electrical engineering degree program (classification changed to EE) in Fall 2017 or later.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics</td>
<td></td>
<td>16</td>
</tr>
<tr>
<td>Science</td>
<td></td>
<td>17-18</td>
</tr>
<tr>
<td>Electrical Engineering Core</td>
<td></td>
<td>33</td>
</tr>
<tr>
<td>Electrical Engineering Advanced Electives</td>
<td></td>
<td>24</td>
</tr>
<tr>
<td>Professional Electives</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>Communication Skills</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Liberal Studies</td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>Total Credits</td>
<td></td>
<td>120-121</td>
</tr>
</tbody>
</table>

MATHEMATICS

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 221</td>
<td>Calculus and Analytic Geometry 1</td>
<td>5</td>
</tr>
<tr>
<td>or MATH 217</td>
<td>Calculus with Algebra and Trigonometry II</td>
<td>4</td>
</tr>
<tr>
<td>or MATH 275</td>
<td>Topics in Calculus I</td>
<td></td>
</tr>
<tr>
<td>MATH 222</td>
<td>Calculus and Analytic Geometry 2</td>
<td>4</td>
</tr>
<tr>
<td>or MATH 276</td>
<td>Topics in Calculus II</td>
<td></td>
</tr>
<tr>
<td>MATH 234</td>
<td>Calculus--Functions of Several Variables</td>
<td>4</td>
</tr>
<tr>
<td>Probability and Statistics Elective</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>STAT 311</td>
<td>Introduction to Theory and Methods of Mathematical Statistics I</td>
<td>3</td>
</tr>
<tr>
<td>STAT/M E 424</td>
<td>Statistical Experimental Design</td>
<td></td>
</tr>
<tr>
<td>MATH/STAT 431</td>
<td>Introduction to the Theory of Probability</td>
<td>3</td>
</tr>
<tr>
<td>E C E 331</td>
<td>Introduction to Random Signal Analysis and Statistics</td>
<td>3</td>
</tr>
<tr>
<td>Total Credits</td>
<td></td>
<td>16</td>
</tr>
</tbody>
</table>

1 In additional to the courses listed in the Mathematics Requirement at least one additional course must be completed for the advanced mathematics auxiliary condition. Choose: MATH 319 Techniques in Ordinary Differential Equations, MATH 320 Linear Algebra and Differential Equations, MATH 340 Elementary Matrix and Linear Algebra, MATH 341 Linear Algebra, E C E 334 State Space Systems Analysis, or E C E/COMP SCI/M E 532 Matrix Methods in Machine Learning to satisfy the advanced math auxiliary condition. These credits count toward either professional electives or advanced elective credit depending on the course.

2 MATH 375 and MATH 376 taken in sequence will fulfill the requirement for MATH 234, professional elective credit, and advanced math auxiliary condition.

SCIENCE

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP SCI 300</td>
<td>Programming II</td>
<td>3</td>
</tr>
<tr>
<td>PHYSICS 201</td>
<td>General Physics</td>
<td>5</td>
</tr>
<tr>
<td>or PHYSICS 207</td>
<td>General Physics</td>
<td></td>
</tr>
<tr>
<td>or PHYSICS 247</td>
<td>A Modern Introduction to Physics</td>
<td></td>
</tr>
<tr>
<td>PHYSICS 202</td>
<td>General Physics</td>
<td>5</td>
</tr>
<tr>
<td>or PHYSICS 208</td>
<td>General Physics</td>
<td></td>
</tr>
<tr>
<td>or PHYSICS 248</td>
<td>A Modern Introduction to Physics</td>
<td></td>
</tr>
</tbody>
</table>

Select one of the following: 4-5

CHEM 109 Advanced General Chemistry

CHEM 103 General Chemistry I

CHEM 104 General Chemistry II

Total Credits 17-18

1 Students may also fulfill this requirement by taking E M A 201 Statics and E M A 202 Dynamics or E M A 201 Statics and M E 240 Dynamics.

ELECTRICAL ENGINEERING CORE

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>E C E 203</td>
<td>Signals, Information, and Computation</td>
<td>3</td>
</tr>
<tr>
<td>E C E 210</td>
<td>Introductory Experience in Electrical Engineering</td>
<td>2</td>
</tr>
<tr>
<td>E C E 219</td>
<td>Analytical Methods for Electromagnetics Engineering</td>
<td>2</td>
</tr>
<tr>
<td>E C E 220</td>
<td>Electrodynamics I</td>
<td>3</td>
</tr>
<tr>
<td>E C E 230</td>
<td>Circuit Analysis</td>
<td>4</td>
</tr>
<tr>
<td>E C E/PHYSICS 235</td>
<td>Introduction to Solid State Electronics</td>
<td>3</td>
</tr>
<tr>
<td>E C E/COMP SCI 252</td>
<td>Introduction to Computer Engineering</td>
<td>3</td>
</tr>
<tr>
<td>E C E 270</td>
<td>Circuits Laboratory I</td>
<td>1</td>
</tr>
<tr>
<td>E C E 271</td>
<td>Circuits Laboratory II</td>
<td>1</td>
</tr>
<tr>
<td>E C E 330</td>
<td>Signals and Systems</td>
<td>3</td>
</tr>
<tr>
<td>E C E 340</td>
<td>Electronic Circuits I</td>
<td>3</td>
</tr>
<tr>
<td>E C E/COMP SCI 352</td>
<td>Digital System Fundamentals</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Credits 16
E C E 370 Advanced Laboratory 2

Total Credits 33

ELECTRICAL ENGINEERING ADVANCED ELECTIVES

Students must take 22 credits in at least three of six areas and at least 2 credits in two laboratory courses.

- At least 9 credits must be in E C E courses numbered 400 and above.
- At least one course must be a capstone design course.
- Students can count 1 credit of E C E 1 Cooperative Education Program toward advanced electives.
- Students can count up to 6 credits of E C E 399 Independent Study, E C E 489 Honors in Research or E C E 699 Advanced Independent Study toward capstone electives.
- Students can take E C E 379 Special Topics in Electrical and Computer Engineering and E C E 601 Special Topics in Electrical and Computer Engineering as advanced electives.
- Students can count up to 5 credits of COMP SCI courses numbered 500 and above (not including independent study).
- E C E courses numbered 300 and above that are not specified in an area can count toward the total number of advanced elective credits required.

Laboratory

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>E C E 303</td>
<td>Introduction to Real-Time Digital Signal Processing</td>
<td></td>
</tr>
<tr>
<td>E C E 304</td>
<td>Electric Machines Laboratory</td>
<td></td>
</tr>
<tr>
<td>E C E 305</td>
<td>Semiconductor Properties Laboratory</td>
<td></td>
</tr>
<tr>
<td>E C E 306</td>
<td>Linear Active Circuits Laboratory</td>
<td></td>
</tr>
<tr>
<td>E C E 308</td>
<td>Nonlinear Electronic Circuits Laboratory</td>
<td></td>
</tr>
<tr>
<td>E C E 313</td>
<td>Optoelectronics Lab</td>
<td></td>
</tr>
<tr>
<td>E C E 315</td>
<td>Introductory Microprocessor Laboratory</td>
<td></td>
</tr>
<tr>
<td>E C E 317</td>
<td>Sensors Laboratory</td>
<td></td>
</tr>
<tr>
<td>E C E 432</td>
<td>Digital Signal Processing Laboratory</td>
<td></td>
</tr>
<tr>
<td>E C E 453</td>
<td>Embedded Microprocessor System Design</td>
<td></td>
</tr>
<tr>
<td>E C E/B M E 462</td>
<td>Medical Instrumentation 1</td>
<td></td>
</tr>
</tbody>
</table>

Select at least one course from E C E 301 to E C E 317

An additional laboratory course must be taken from the following list:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>E C E 304</td>
<td>Electric Machine &amp; Drive System Laboratory</td>
<td></td>
</tr>
<tr>
<td>E C E 512</td>
<td>Power Electronics Laboratory</td>
<td></td>
</tr>
<tr>
<td>E C E 545</td>
<td>Advanced Microwave Measurements for Communications</td>
<td></td>
</tr>
<tr>
<td>E C E 549</td>
<td>Integrated Circuit Fabrication Laboratory</td>
<td></td>
</tr>
<tr>
<td>E C E 554</td>
<td>Digital Engineering Laboratory</td>
<td></td>
</tr>
<tr>
<td>E C E/M E 577</td>
<td>Automatic Controls Laboratory</td>
<td></td>
</tr>
</tbody>
</table>

1

Designated as a capstone course. Students can also take E C E 491 Senior Design Project for capstone credit.

Fields & Waves

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>E C E 320</td>
<td>Electrodynamics II</td>
<td>3</td>
</tr>
<tr>
<td>E C E 420</td>
<td>Electromagnetic Wave Transmission</td>
<td>3</td>
</tr>
<tr>
<td>E C E 434</td>
<td>Photonics</td>
<td>3</td>
</tr>
<tr>
<td>E C E/N E/PHYSICS 525</td>
<td>Introduction to Plasmas</td>
<td>3</td>
</tr>
<tr>
<td>E C E/N E/PHYSICS 528</td>
<td>Plasma Confinement and Heating</td>
<td>3</td>
</tr>
<tr>
<td>E C E 536</td>
<td>Integrated Optics and Optoelectronics</td>
<td>3</td>
</tr>
<tr>
<td>E C E 547</td>
<td>Advanced Communications Circuit Design</td>
<td>3</td>
</tr>
</tbody>
</table>

1

Designated as a capstone course. Students can also take E C E 491 Senior Design Project for capstone credit.

Systems & Control

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>E C E 332</td>
<td>Feedback Control Systems</td>
<td>3</td>
</tr>
<tr>
<td>E C E 334</td>
<td>State Space Systems Analysis</td>
<td>3</td>
</tr>
<tr>
<td>E C E/M E 439</td>
<td>Introduction to Robotics 1</td>
<td>3</td>
</tr>
<tr>
<td>E C E/M E 577</td>
<td>Automatic Controls Laboratory 1</td>
<td>4</td>
</tr>
</tbody>
</table>

1

Designated as a capstone course. Students can also take E C E 491 Senior Design Project for capstone credit.

Power & Machines

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>E C E 355</td>
<td>Electromechanical Energy Conversion</td>
<td>3</td>
</tr>
<tr>
<td>E C E 356</td>
<td>Electric Power Processing for Alternative Energy Systems</td>
<td>3</td>
</tr>
<tr>
<td>E C E 411</td>
<td>Introduction to Electric Drive Systems</td>
<td>3</td>
</tr>
<tr>
<td>E C E 412</td>
<td>Power Electronic Circuits 1</td>
<td>3</td>
</tr>
<tr>
<td>E C E 427</td>
<td>Electric Power Systems 1</td>
<td>3</td>
</tr>
<tr>
<td>E C E 504</td>
<td>Electric Machine &amp; Drive System Laboratory</td>
<td>2-3</td>
</tr>
</tbody>
</table>

1
Electrical Engineering, B.S.

ECE 511 Theory and Control of Synchronous Machines 3

ECE 512 Power Electronics Laboratory 1 3

Designated as a capstone course. Students can also take ECE 491 Senior Design Project for capstone credit.

Communications & Signal Processing

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE 331</td>
<td>Introduction to Random Signal Analysis and Statistics</td>
<td>3</td>
</tr>
<tr>
<td>ECE 401</td>
<td>Electro-Acoustical Engineering</td>
<td>3</td>
</tr>
<tr>
<td>ECE 431</td>
<td>Digital Signal Processing 1</td>
<td>3</td>
</tr>
<tr>
<td>ECE 432</td>
<td>Digital Signal Processing Laboratory 1</td>
<td>3</td>
</tr>
<tr>
<td>ECE/COMP SCI/MATH 435</td>
<td>Introduction to Cryptography</td>
<td>3</td>
</tr>
<tr>
<td>ECE 436</td>
<td>Communication Systems 1</td>
<td>3</td>
</tr>
<tr>
<td>ECE 437</td>
<td>Communication Systems II 1</td>
<td>3</td>
</tr>
<tr>
<td>ECE 447</td>
<td>Applied Communications Systems 1</td>
<td>3</td>
</tr>
<tr>
<td>ECE/COMP SCI/M E 532</td>
<td>Matrix Methods in Machine Learning 1</td>
<td>3</td>
</tr>
<tr>
<td>ECE/COMP SCI 533</td>
<td>Image Processing 1</td>
<td>3</td>
</tr>
<tr>
<td>ECE 537</td>
<td>Communication Networks 1</td>
<td>3</td>
</tr>
<tr>
<td>ECE/COMP SCI/M E 539</td>
<td>Introduction to Artificial Neural Networks 1</td>
<td>3</td>
</tr>
<tr>
<td>ECE/MATH 641</td>
<td>Introduction to Error-Correcting Codes</td>
<td>3</td>
</tr>
</tbody>
</table>

Designated as a capstone course. Students can also take ECE 491 Senior Design Project for capstone credit.

Circuits & Devices

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE 335</td>
<td>Microelectronic Devices</td>
<td>3</td>
</tr>
<tr>
<td>ECE 342</td>
<td>Electronic Circuits II</td>
<td>3</td>
</tr>
<tr>
<td>ECE 445</td>
<td>Semiconductor Physics and Devices</td>
<td>3</td>
</tr>
<tr>
<td>ECE/B M E 462</td>
<td>Medical Instrumentation 1</td>
<td>3</td>
</tr>
<tr>
<td>ECE 466</td>
<td>Electronics of Solids</td>
<td>3</td>
</tr>
<tr>
<td>ECE 541</td>
<td>Analog MOS Integrated Circuit Design 1</td>
<td>3</td>
</tr>
<tr>
<td>ECE 542</td>
<td>Introduction to Microelectromechanical Systems 1</td>
<td>3</td>
</tr>
<tr>
<td>ECE 545</td>
<td>Advanced Microwave Measurements for Communications 1</td>
<td>3</td>
</tr>
<tr>
<td>ECE 548</td>
<td>Integrated Circuit Design 1</td>
<td>3</td>
</tr>
<tr>
<td>ECE 549</td>
<td>Integrated Circuit Fabrication Laboratory 1</td>
<td>3</td>
</tr>
<tr>
<td>ECE 555</td>
<td>Digital Circuits and Components 1</td>
<td>3</td>
</tr>
</tbody>
</table>

Designated as a capstone course. Students can also take ECE 491 Senior Design Project for capstone credit.

Computers & Computing

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE 353</td>
<td>Introduction to Microprocessor Systems</td>
<td>3</td>
</tr>
<tr>
<td>ECE/COMP SCI 354</td>
<td>Machine Organization and Programming</td>
<td>3</td>
</tr>
<tr>
<td>ECE 453</td>
<td>Embedded Microprocessor System Design 1</td>
<td>4</td>
</tr>
<tr>
<td>ECE 454</td>
<td>Mobile Computing Laboratory 1</td>
<td>4</td>
</tr>
<tr>
<td>ECE/E/B M E 463</td>
<td>Computers in Medicine</td>
<td>3</td>
</tr>
<tr>
<td>ECE/COMP SCI 506</td>
<td>Software Engineering</td>
<td>3</td>
</tr>
<tr>
<td>ECE 551</td>
<td>Digital System Design and Synthesis 1</td>
<td>3</td>
</tr>
<tr>
<td>ECE/COMP SCI 552</td>
<td>Introduction to Computer Architecture</td>
<td>3</td>
</tr>
<tr>
<td>ECE 553</td>
<td>Testing and Testable Design of Digital Systems 1</td>
<td>3</td>
</tr>
<tr>
<td>ECE 554</td>
<td>Digital Engineering Laboratory 1</td>
<td>4</td>
</tr>
<tr>
<td>ECE 556</td>
<td>Design Automation of Digital Systems 1</td>
<td>3</td>
</tr>
</tbody>
</table>

Designated as a capstone course. Students can also take ECE 491 Senior Design Project for capstone credit.

Professional Electives

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classes to be taken in an area of professional interest. The following courses are acceptable as professional electives if the courses are not used to meet any other degree requirements.</td>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH/COMP SCI 240</td>
<td>Introduction to Discrete Mathematics</td>
<td></td>
</tr>
<tr>
<td>ECE 204</td>
<td>Data Science &amp; Engineering</td>
<td></td>
</tr>
<tr>
<td>ECE 320</td>
<td>Electrodynamics II</td>
<td></td>
</tr>
<tr>
<td>ECE 331</td>
<td>Introduction to Random Signal Analysis and Statistics</td>
<td></td>
</tr>
<tr>
<td>ECE 332</td>
<td>Feedback Control Systems</td>
<td></td>
</tr>
<tr>
<td>ECE 334</td>
<td>State Space Systems Analysis</td>
<td></td>
</tr>
<tr>
<td>ECE 335</td>
<td>Microelectronic Devices</td>
<td></td>
</tr>
<tr>
<td>ECE 342</td>
<td>Electronic Circuits II</td>
<td></td>
</tr>
<tr>
<td>ECE/COMP SCI 354</td>
<td>Machine Organization and Programming</td>
<td></td>
</tr>
<tr>
<td>ECE 355</td>
<td>Electromechanical Energy Conversion</td>
<td></td>
</tr>
<tr>
<td>ECE 356</td>
<td>Electric Power Processing for Alternative Energy Systems</td>
<td></td>
</tr>
<tr>
<td>ECE courses numbered 399 and higher</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMP SCI courses numbered 400 and higher</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH 319</td>
<td>Techniques in Ordinary Differential Equations</td>
<td></td>
</tr>
<tr>
<td>MATH 320</td>
<td>Linear Algebra and Differential Equations 1</td>
<td></td>
</tr>
</tbody>
</table>

1 Designated as a capstone course. Students can also take ECE 491 Senior Design Project for capstone credit.
MATH 321 Applied Mathematical Analysis
MATH 322 Applied Mathematical Analysis
MATH 340 Elementary Matrix and Linear Algebra
MATH 341 Linear Algebra
MATH courses numbered 400 and higher
STATS courses numbered 400 and higher
Any biological science course that is designated as intermediate or advanced
Any physical science course that is designated as intermediate or advanced (except PHYSICS 241)
Any natural science course that is designated as advanced except that Math, Computer Sciences, and Statistics courses must follow the above criteria
Engineering courses numbered 300 and higher that are not E C E or cross-listed with E C E
Up to six credits of Professional Electives can be taken from School of Business classes numbered 300 and higher.
DS 501 Special Topics (Wearable Technologies)
DANCE 560 Current Topics in Dance: Workshop (Making Digital Lighting Controls)

Students may only earn degree credit for MATH 320 Linear Algebra and Differential Equations or MATH 340 Elementary Matrix and Linear Algebra, not both.

**COMMUNICATION SKILLS**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 100</td>
<td>Introduction to College Composition</td>
<td>3</td>
</tr>
<tr>
<td>or LSC 100</td>
<td>Science and Storytelling</td>
<td></td>
</tr>
<tr>
<td>or COM ARTS 100</td>
<td>Introduction to Speech Composition</td>
<td></td>
</tr>
<tr>
<td>or COM ARTS 181</td>
<td>Elements of Speech-Honors Course</td>
<td></td>
</tr>
<tr>
<td>or ESL 118</td>
<td>Academic Writing II</td>
<td></td>
</tr>
<tr>
<td>INTEREGR 397</td>
<td>Engineering Communication</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td></td>
<td><strong>6</strong></td>
</tr>
</tbody>
</table>

**LIBERAL STUDIES ELECTIVES**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>College of Engineering Liberal Studies Requirements</td>
<td></td>
</tr>
<tr>
<td>Complete requirements (<a href="http://guide.wisc.edu/undergraduate/engineering/#requirementstext">http://guide.wisc.edu/undergraduate/engineering/#requirementstext</a>)</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

1 All liberal studies credits must be identified with the letter H, S, L, or Z. Language courses are acceptable without the letter and are considered humanities. **Note:** See an E C E advisor and/or the EE Curriculum Guide for additional information.

**HONORS IN UNDERGRADUATE RESEARCH PROGRAM**

Qualified undergraduates may earn an Honors in Research designation on their transcript and diploma by completing 8 credits of undergraduate honors research, including a senior thesis. Further information is available in the department office.

**NAMED OPTION**

View as list or grid


**TOTAL DEGREE CREDITS: 120**

**UNIVERSITY DEGREE REQUIREMENTS**

| Total Degree | To receive a bachelor’s degree from UW–Madison, students must earn a minimum of 120 degree credits. The requirements for some programs may exceed 120 degree credits. Students should consult with their college or department advisor for information on specific credit requirements. |
| Residency   | Degree candidates are required to earn a minimum of 30 credits in residence at UW–Madison. "In residence" means on the UW–Madison campus with an undergraduate degree classification. "In residence" credit also includes UW–Madison courses offered in distance or online formats and credits earned in UW–Madison Study Abroad/Study Away programs. |
| Quality of Work | Undergraduate students must maintain the minimum grade point average specified by the school, college, or academic program to remain in good academic standing. Students whose academic performance drops below these minimum thresholds will be placed on academic probation. |

**LEARNING OUTCOMES**

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

FOUR-YEAR PLAN

SAMPLE FOUR-YEAR PLAN

First Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 221</td>
<td>5</td>
<td>E C E/COMP SCI 252</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 103, 104, or 109</td>
<td>4-5 PHYSICS 201</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>E C E 210</td>
<td>2</td>
<td>MATH 222</td>
<td>4</td>
</tr>
<tr>
<td>Liberal Studies Elective</td>
<td>3</td>
<td>E C E 210</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>14-15</td>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>

Second Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYSICS 202</td>
<td>5</td>
<td>E C E 219</td>
<td>2</td>
</tr>
<tr>
<td>MATH 234</td>
<td>4</td>
<td>COMP SCI 300</td>
<td>3</td>
</tr>
<tr>
<td>E C E 203</td>
<td>3</td>
<td>E C E 230</td>
<td>4</td>
</tr>
<tr>
<td>Liberal Studies Elective</td>
<td>3</td>
<td>E C E 270</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>13</td>
<td></td>
</tr>
</tbody>
</table>

Third Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>E C E/PHYSICS 235</td>
<td>3</td>
<td>ECE Advanced Elective</td>
<td>3</td>
</tr>
<tr>
<td>Statistics/Probability Elective</td>
<td>3</td>
<td>ECE Advanced Elective</td>
<td>3</td>
</tr>
<tr>
<td>E C E 340</td>
<td>3</td>
<td>INTEREGR 397</td>
<td>3</td>
</tr>
<tr>
<td>E C E 271</td>
<td>1</td>
<td>EE Advanced Lab (3XX)</td>
<td>1</td>
</tr>
<tr>
<td>E C E/COMP SCI 352</td>
<td>3</td>
<td>Liberal Studies Elective</td>
<td>3</td>
</tr>
<tr>
<td>E C E 220</td>
<td>3</td>
<td>Professional Elective (Adv Math)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>16</td>
<td></td>
</tr>
</tbody>
</table>

Fourth Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liberal Studies Elective</td>
<td>3</td>
<td>Professional Elective</td>
<td>3</td>
</tr>
<tr>
<td>ECE Advanced Elective</td>
<td>3</td>
<td>ECE Advanced Elective (4XX)</td>
<td>3</td>
</tr>
<tr>
<td>ECE Advanced Elective</td>
<td>4</td>
<td>ECE Advanced Elective (4XX)</td>
<td>3</td>
</tr>
<tr>
<td>EE Advanced Lab (3XX)</td>
<td>1</td>
<td>ECE Capstone Design</td>
<td>3</td>
</tr>
<tr>
<td>E C E 370</td>
<td>2</td>
<td>Liberal Studies Elective</td>
<td>3</td>
</tr>
<tr>
<td>Professional Elective</td>
<td>3</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>

Total Credits 120-121

ADVISORY AND CAREERS

ADVISORY

Each College of Engineering program has academic advisors dedicated to serving its students. Program advisors can help current College of Engineering students with questions about accessing courses, navigating degree requirements, resolving academic issues and more. Students can find their assigned advisor on the homepage of their student center.

ENGINEERING CAREER SERVICES

Engineering Career Services (ECS) assists students in identifying pre-professional work-based learning experiences such as co-ops and summer internships, considering and applying to graduate or professional school, and finding full-time professional employment during their graduation year.

ECS offers two major career fairs per year, assists with resume writing and interviewing skills, hosts workshops on the job search, and meets one-on-one with students to discuss offer negotiations.

Students are encouraged to utilize the ECS office early in their academic careers. For comprehensive information on ECS programs and workshops, see the ECS website or call 608-262-3471.

PEOPLE

PROFESSORS

Susan Hagness (Chair)
Nader Behdad
Daniel Botez
Azadeh Davoodi (Associate Chair for Undergraduate Studies)
John A. Gubner (Associate Chair for Operations)
Yu Hen Hu
Hongrui Jiang (Associate Chair for Graduate Studies)
Irena Knezevic
Bernard Lesieutre
Mikko Lipasti
Zhenqiang Ma
Luke J. Mawst
Robert Nowak
Parameswaran Ramanathan
Bulent Sarioglu
William A. Sethares
Daniel van der Weide
Giri Venkataramanan
Amy E. Wendt
Zongfu Yu

ASSOCIATE PROFESSORS

Kassem Fawaz (Associate Chair for Research)
Mikhail Kats
Younghyun Kim
Daniel Ludois
Paul H. Milenkovic
Umit Ogras
Dimitris Papailiopoulos
Line Roald
Andreas Velten

ASSISTANT PROFESSORS

Joseph Andrews
Jennifer Choy
Grigoris Chrysos
Jeremy Coulson
Dominic Gross
Chirag Gupta
Tsung-Wei Huang
Robert Jacobberger
Akhilesh Jaiswal
Bhuvana Krishnaswamy
Kangwook Lee
Chu Ma
Pedro Morgado
Shubhra Pasayat
Jinia Roy
Joshua San Miguel
Manish Singh
Hihan Sun
Eric Tervo
Ramya Korlakai Vinayak
Ying Wang
Feng Ye
Lei Zhou

TEACHING FACULTY
Mark C. Allie
Eric Hoffman
Joe Krachey
Srdjan Milicic

TEACHING PROFESSOR
Eduardo Arvelo
Setareh Behroozi
Steven Fredette
Nathan Strachen

See also Electrical and Computer Engineering Faculty Directory (https://directory.engr.wisc.edu/ece/faculty/).

ACCREDITATION
Accredited by the Engineering Accreditation Commission of ABET (https://www.abet.org), https://www.abet.org, under the commission’s General Criteria and Program Criteria for Electrical, Computer, Communication, Telecommunication(s), and Similarly Named Engineering Programs.

Note: Undergraduate Program Educational Objectives and Student Outcomes are made publicly available at the Departmental website.
(In this Guide, the program’s Student Outcomes are designated by our campus as “Learning Outcomes.”)