**University of Wisconsin – Milwaukee**  
**College of Engineering and Applied Science**  
**ELECTRICAL ENGINEERING CURRICULUM**

The typical number of credits required to complete the Bachelor of Science in Engineering with a major in Electrical Engineering is 126 credits. Students who need background preparation courses may need additional credits. See information below regarding placement examinations.

### Engineering Core Courses (17 credits)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisite</th>
</tr>
</thead>
<tbody>
<tr>
<td>CompSci 240</td>
<td>Introduction to Engineering Programming</td>
<td>3</td>
<td>Math 116 or Math Placement Code 40</td>
</tr>
<tr>
<td>EAS 200</td>
<td>Professional Seminar</td>
<td>1</td>
<td>None</td>
</tr>
<tr>
<td>ElecEng 101</td>
<td>Fundamentals of Electrical Engineering</td>
<td>3</td>
<td>Math 116(C)</td>
</tr>
<tr>
<td>ElecEng 301</td>
<td>Electrical Circuits I</td>
<td>3</td>
<td>Physics 210(C) or 220 (C)</td>
</tr>
<tr>
<td>MatlEng 201</td>
<td>Engineering Materials</td>
<td>4</td>
<td>Chem 102 or 105</td>
</tr>
<tr>
<td>MechEng 301</td>
<td>Basic Engineering Thermodynamics</td>
<td>3</td>
<td>Math 233, Physics 209</td>
</tr>
</tbody>
</table>

### Electrical Engineering Major (36 credits)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisite</th>
</tr>
</thead>
<tbody>
<tr>
<td>ElecEng 305</td>
<td>Electrical Circuits II</td>
<td>4</td>
<td>ElecEng 234, 301</td>
</tr>
<tr>
<td>ElecEng 310</td>
<td>Signals &amp; Systems</td>
<td>3</td>
<td>ElecEng 305(C)</td>
</tr>
<tr>
<td>ElecEng 330</td>
<td>Electronics I</td>
<td>4</td>
<td>ElecEng 305(C)</td>
</tr>
<tr>
<td>ElecEng 335</td>
<td>Electronics II</td>
<td>4</td>
<td>ElecEng 310(C), 330</td>
</tr>
<tr>
<td>ElecEng 354</td>
<td>Digital Logic</td>
<td>3</td>
<td>CompSci 240 or 250</td>
</tr>
<tr>
<td>ElecEng 361</td>
<td>Electromagnetic Fields</td>
<td>3</td>
<td>ElecEng 234, Math 233*, Physics 210* &amp; 215* or 220*</td>
</tr>
<tr>
<td>ElecEng 362</td>
<td>Electromechanical Energy Conversion</td>
<td>4</td>
<td>ElecEng 305, 361</td>
</tr>
<tr>
<td>ElecEng 367</td>
<td>Introduction to Microprocessors</td>
<td>4</td>
<td>CompSci 240 or 250, ElecEng 354*</td>
</tr>
<tr>
<td>ElecEng 420</td>
<td>Random Signals &amp; Systems</td>
<td>3</td>
<td>Jr St, ElecEng 310</td>
</tr>
<tr>
<td>ElecEng 595</td>
<td>Capstone Design Project</td>
<td>4</td>
<td>Sr St, ElecEng 335, 367</td>
</tr>
</tbody>
</table>

### Mathematics (14-16 credits)

One of the following Calculus sequences must be completed:
- Math 231-232-233: 12 credits  
- Or Math 221-222 (Honors): 10 credits  
- And ElecEng 234: Analytical Methods in Engineering: 4 credits  

### Chemistry (5 credits)

One of the following courses must be completed:
- Chem 102 or 105: 5 credits  

### Physics (10 credits)

- Physics 219 -220: Physics 219: Math 222 (C)  

### General Education Requirements

**Distribution Requirements (13 credits)**

- **Art** 3 credits
- **Humanities** 3 credits
- **Social Science** 6 credits
- **English 310**: Writing, Speaking & Technoscience in the 21st Century: 3 English Competency

**Cultural Diversity** - One of the arts, humanities, or social science courses selected must also meet the UWM cultural diversity requirement.

**Free Electives** 3 credits

**Competency Requirements**

### English Composition (0-6 credits)

The English Composition requirement is satisfied by:
- Earning a satisfactory score on the English placement test  
- Earning a grade of C or higher in English 102  
- Transferring with a grade of C or better in a course (3 credits or more) equivalent to English 102 or higher level expository writing course

### Foreign Language (0-8 credits)

The foreign language requirement can be completed with one of these options:
- Two years of a single foreign language in high school
- Two semesters of a single foreign language in college
- Demonstrate ability by examination

### Placement Examinations

Students without previous college level credits in Math, Chemistry or English may be required to take placement exams. The results of these tests determine the appropriate course in which to register. Background prerequisite courses may be required in addition to the courses listed above.

**Effective Fall 2016**
Technical Electives – Electrical Engineering Major

The electrical engineering program requires a total of 24 credits of technical electives, chosen as follows.

<table>
<thead>
<tr>
<th>Group A Technical Electives: Select at least 18 credits from the following list. All non-required Electrical Engineering courses numbered 400-699 are Group A Technical Electives</th>
<th>Credits</th>
<th>Prerequisite</th>
</tr>
</thead>
<tbody>
<tr>
<td>EAS 001 Co-op Work Period</td>
<td>3</td>
<td>Prior Cons Co-Op Dir</td>
</tr>
<tr>
<td>EAS 497 Study Abroad</td>
<td>3</td>
<td>Acceptance to Study Abroad Program</td>
</tr>
<tr>
<td>CompSci 520 Computer Networks</td>
<td>3</td>
<td>Jr St, CompSci 315 or 458 or ElecEng 367</td>
</tr>
<tr>
<td>CompSci 530 Computer Networks Laboratory</td>
<td>3</td>
<td>Jr St, CompSci 520</td>
</tr>
<tr>
<td>ElecEng 410 Principles of Discrete Systems &amp; Digital Signal Processing</td>
<td>3</td>
<td>Jr St, ElecEng 310</td>
</tr>
<tr>
<td>ElecEng 421 Communication Systems</td>
<td>3</td>
<td>Jr St, ElecEng 335(C)</td>
</tr>
<tr>
<td>ElecEng 436 Introduction of Medical Instrumentation</td>
<td>3</td>
<td>Jr St, ElecEng 305</td>
</tr>
<tr>
<td>ElecEng 437 Introduction to Biomedical Imaging</td>
<td>3</td>
<td>Sr St, ElecEng 310</td>
</tr>
<tr>
<td>ElecEng 451 Introduction to VLSI Design</td>
<td>3</td>
<td>Jr St, ElecEng 330, 354</td>
</tr>
<tr>
<td>ElecEng 457 Digital Logic Laboratory</td>
<td>3</td>
<td>Jr St, ElecEng 330, 354</td>
</tr>
<tr>
<td>ElecEng 458 Computer Architecture</td>
<td>3</td>
<td>Jr St., ElecEng 354, CompSci 315 or ElecEng 367</td>
</tr>
<tr>
<td>ElecEng 461 Microwave Engineering</td>
<td>3</td>
<td>Jr St, ElecEng 361</td>
</tr>
<tr>
<td>ElecEng 462 Antenna Theory</td>
<td>3</td>
<td>Jr St, ElecEng 361</td>
</tr>
<tr>
<td>ElecEng 464 Fundamentals of Photonics</td>
<td>3</td>
<td>Jr St, ElecEng 361</td>
</tr>
<tr>
<td>ElecEng 465 Broadband Optical Networks</td>
<td>3</td>
<td>Jr St, ElecEng 305, 361</td>
</tr>
<tr>
<td>ElecEng 471 Electric Power Systems</td>
<td>3</td>
<td>Jr St, ElecEng 362(C)</td>
</tr>
<tr>
<td>ElecEng 472 Introduction to Wind Energy</td>
<td>3</td>
<td>Jr St</td>
</tr>
<tr>
<td>ElecEng 474 Introduction to Control Systems</td>
<td>4</td>
<td>Jr St, CivEng 202, CompSci 240, ElecEng 310</td>
</tr>
<tr>
<td>ElecEng 482 Introduction to Nanoelectronics</td>
<td>3</td>
<td>Jr St, ElecEng 330(C), 361(C)</td>
</tr>
<tr>
<td>ElecEng 490 Topics in Electrical Engineering</td>
<td>1-3</td>
<td>Jr St</td>
</tr>
<tr>
<td>ElecEng 541 Integrated Circuits &amp; Systems</td>
<td>3</td>
<td>Jr St, ElecEng 330</td>
</tr>
<tr>
<td>ElecEng 545 FPGA Embedded CPUs &amp; Firmware Development</td>
<td>3</td>
<td>Jr St, ElecEng 367, 457</td>
</tr>
<tr>
<td>ElecEng 562 Telecommunication Circuits</td>
<td>3</td>
<td>Sr St, ElecEng 330</td>
</tr>
<tr>
<td>ElecEng 565 Optical Communication</td>
<td>3</td>
<td>Sr St, ElecEng 330, 361 or 465</td>
</tr>
<tr>
<td>ElecEng 568 Applications of Digital Signal Processing</td>
<td>3</td>
<td>Jr St, ElecEng 310, 367</td>
</tr>
<tr>
<td>ElecEng 572 Power Electronics</td>
<td>3</td>
<td>Sr St, ElecEng 335(C)</td>
</tr>
<tr>
<td>ElecEng 574 Intermediate Control Systems</td>
<td>3</td>
<td>Sr St, ElecEng 474 or MechEng 474</td>
</tr>
<tr>
<td>ElecEng 575 Analysis of Electric Machines &amp; Motor Drives</td>
<td>3</td>
<td>Jr St, ElecEng 330, 362</td>
</tr>
<tr>
<td>ElecEng 588 Fundamentals of Nanotechnology</td>
<td>3</td>
<td>Jr St, ElecEng 361</td>
</tr>
<tr>
<td>ElecEng 598 Senior Thesis</td>
<td>3</td>
<td>Sr St, Cons Instr</td>
</tr>
<tr>
<td>Ind Eng 360 Engineering Economic Analysis</td>
<td>3</td>
<td>Jr St</td>
</tr>
<tr>
<td>MatEng 481 Electronic Materials</td>
<td>3</td>
<td>Jr St, MatEng 201</td>
</tr>
<tr>
<td>MechEng 321 Basic Heat Transfer</td>
<td>4</td>
<td>Jr St, MechEng 301</td>
</tr>
<tr>
<td>BusAdm 447 Entrepreneurship</td>
<td>3</td>
<td>Jr St, Bus Adm 350</td>
</tr>
</tbody>
</table>

1 Students who earn 3 or more credits of Co-Op may use 3 of those credits as approved technical electives.

2 Students who earn 3 or more credits of Study Abroad may use 3 of those credits as approved technical electives.

<table>
<thead>
<tr>
<th>Group B Technical Electives: Choose no more than 6 credits from the following list. Any Chemistry course 200-level or above, or Chem 104*</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any Mathematics course 400-level or above</td>
<td>3</td>
</tr>
<tr>
<td>Any Physics course 300-level or above</td>
<td>3</td>
</tr>
<tr>
<td>Any Biology course 150-level or above</td>
<td>3</td>
</tr>
<tr>
<td>Any Atmospheric Sciences course 100-level or above</td>
<td>3</td>
</tr>
<tr>
<td>Any Computer Science course 200-level or above</td>
<td>3</td>
</tr>
</tbody>
</table>

3 Students who take Chem 102 and 104 (equalling a minimum of 8 credits) may use up to 3 credits of Chem 104 as Group B technical electives.

*C or better in prerequisite

(C) Concurrent Enrollment in Designated Course

**Degree Requirements:** Students must maintain an average GPA of at least 2.0 on all work attempted at the University and in all courses offered by the College. Students majoring in Electrical Engineering must maintain an average GPA of at least 2.5 in all 300-level and above courses in the Electrical Engineering department. Transferable courses will be included as appropriate. Advancement to major status is required for graduation.