ELECTRICAL AND COMPUTER ENGINEERING: PROFESSIONAL, M.S.

REQUIREMENTS

MINIMUM GRADUATE SCHOOL REQUIREMENTS

Review the Graduate School minimum academic progress and degree requirements (http://guide.wisc.edu/graduate/#policiesandrequierments), in addition to the program requirements listed below.

NAMED OPTION REQUIREMENTS

MODE OF INSTRUCTION

<table>
<thead>
<tr>
<th>Face to Face</th>
<th>Evening/Weekend</th>
<th>Online</th>
<th>Hybrid</th>
<th>Accelerated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Mode of Instruction Definitions

Accelerated: Accelerated programs are offered at a fast pace that condenses the time to completion. Students typically take enough credits aimed at completing the program in a year or two.

Evening/Weekend: Courses meet on the UW–Madison campus only in evenings and/or on weekends to accommodate typical business schedules. Students have the advantages of face-to-face courses with the flexibility to keep work and other life commitments.

Face-to-Face: Courses typically meet during weekdays on the UW–Madison Campus.

Hybrid: These programs combine face-to-face and online learning formats. Contact the program for more specific information.

Online: These programs are offered 100% online. Some programs may require an on-campus orientation or residency experience, but the courses will be facilitated in an online format.

CURRICULAR REQUIREMENTS

Requirement| Detail |
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Minimum Credit Requirement</td>
<td>30 credits</td>
</tr>
<tr>
<td>Minimum Residence Credit Requirement</td>
<td>23 credits</td>
</tr>
<tr>
<td>Minimum Graduate Coursework Requirement</td>
<td>15 credits must be graduate-level coursework. Details can be found in the Graduate School’s Minimum Graduate Coursework (50%) policy (<a href="https://policy.wisc.edu/library/UW-1244">https://policy.wisc.edu/library/UW-1244</a>)).</td>
</tr>
</tbody>
</table>

Overall | 3.00 GPA required.
Graduate GPA | This program follows the Graduate School’s GPA Requirement policy (https://policy.wisc.edu/library/UW-1203).
Other Grade Requirements | 1. A grade of B or better in any course is acceptable.
2. A grade of BC in an E C E course is acceptable, provided the total cumulative GPA for E C E courses is greater than or equal to 3.00.
3. A grade of BC or C in a non–E C E course is acceptable only if approved by the Graduate Committee.
Assessments and Examinations | n/a
Language Requirements | Non-native speakers of English who enroll in the M.S. program must take the ESLAT test on arrival at the university and then take any recommended courses based on the exam results. In addition, if a student’s advisor believes that his or her technical writing ability needs improvement, the student may be required to undertake remedial work.

REQUIRED COURSES

Mandatory Courses

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>E C E 610</td>
<td>Seminar in Electrical and Computer Engineering</td>
<td>1</td>
</tr>
</tbody>
</table>

Elective Courses

12 of the 30 credit hours must be taken within one curriculum path. Please see sample curriculum paths below. Students may take courses from combinations of different paths to create custom degrees that are well-aligned with their professional goals with advisor approval.

Other Course Requirements

21 of the 30 credit hours must be taken in E C E. Approved graduate or undergraduate transfer credits in ECE courses may count toward the 21 E C E credits.

No more than 9 credits can be taken outside of E C E.

Special topics courses E C E 601 Special Topics in Electrical and Computer Engineering or E C E 901 Special Topics in Electrical and Computer Engineering may be used for up to 3 credits towards a curriculum path with advisor approval.

No more than 3 independent study credits count toward the degree. This includes E C E 699 and E C E 999.

No more than 3 credits of ESL courses count toward the degree.

Thesis credits are not allowed (E C E 790 or E C E 890).

Please keep written communications (emails are acceptable) of approvals from your faculty advisor.

Computer Engineering Sample Curriculum Path

Embedded Systems

Select 12 credits from the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>E C E 551</td>
<td>Digital System Design and Synthesis</td>
<td>3</td>
</tr>
<tr>
<td>Code</td>
<td>Title</td>
<td>Credits</td>
</tr>
<tr>
<td>-------------</td>
<td>------------------------------------------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>E C E/</td>
<td>Introduction to Computer Architecture</td>
<td>3</td>
</tr>
<tr>
<td>COMP SCI 552</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E C E 555</td>
<td>Digital Circuits and Components</td>
<td>3</td>
</tr>
<tr>
<td>E C E/</td>
<td>Real-time Computing Systems</td>
<td>3</td>
</tr>
<tr>
<td>COMP SCI 750</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E C E 751</td>
<td>Embedded Computing Systems</td>
<td>3</td>
</tr>
<tr>
<td>E C E 753</td>
<td>Fault-Tolerant Computing</td>
<td>3</td>
</tr>
<tr>
<td>COMP SCI 537</td>
<td>Introduction to Operating Systems</td>
<td>4</td>
</tr>
<tr>
<td>COMP SCI 642</td>
<td>Introduction to Information Security</td>
<td>3</td>
</tr>
<tr>
<td>COMP SCI 763</td>
<td>Security and Privacy for Data Science</td>
<td>3</td>
</tr>
<tr>
<td>E C E/</td>
<td>Communication Networks</td>
<td>3</td>
</tr>
<tr>
<td>COMP SCI 707</td>
<td>Mobile and Wireless Networking</td>
<td>3</td>
</tr>
<tr>
<td>E C E 751</td>
<td>Embedded Computing Systems</td>
<td>3</td>
</tr>
<tr>
<td>E C E 753</td>
<td>Fault-Tolerant Computing</td>
<td>3</td>
</tr>
<tr>
<td>COMP SCI 537</td>
<td>Introduction to Operating Systems</td>
<td>4</td>
</tr>
<tr>
<td>COMP SCI 763</td>
<td>Security and Privacy for Data Science</td>
<td>3</td>
</tr>
<tr>
<td>E C E/</td>
<td>Digital System Design and Synthesis</td>
<td>3</td>
</tr>
<tr>
<td>COMP SCI 552</td>
<td>Introduction to Computer Architecture</td>
<td>3</td>
</tr>
<tr>
<td>E C E 553</td>
<td>Testing and Testable Design of Digital Systems</td>
<td>3</td>
</tr>
<tr>
<td>E C E 555</td>
<td>Digital Circuits and Components</td>
<td>3</td>
</tr>
<tr>
<td>E C E 556</td>
<td>Design Automation of Digital Systems</td>
<td>3</td>
</tr>
<tr>
<td>E C E 751</td>
<td>Embedded Computing Systems</td>
<td>3</td>
</tr>
<tr>
<td>E C E/</td>
<td>VLSI Systems Design</td>
<td>3</td>
</tr>
<tr>
<td>COMP SCI 755</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E C E/</td>
<td>Computer-Aided Design for VLSI</td>
<td>3</td>
</tr>
<tr>
<td>COMP SCI 756</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E C E</td>
<td>Digital System Design and Synthesis</td>
<td>3</td>
</tr>
<tr>
<td>E C E/</td>
<td>Introduction to Computer Architecture</td>
<td>3</td>
</tr>
<tr>
<td>COMP SCI 552</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E C E 553</td>
<td>Testing and Testable Design of Digital Systems</td>
<td>3</td>
</tr>
<tr>
<td>E C E/</td>
<td>Advanced Computer Architecture I</td>
<td>3</td>
</tr>
<tr>
<td>COMP SCI 752</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E C E/</td>
<td>VLSI Systems Design</td>
<td>3</td>
</tr>
<tr>
<td>COMP SCI 755</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E C E/</td>
<td>Advanced Computer Architecture II</td>
<td>3</td>
</tr>
<tr>
<td>COMP SCI 757</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E C E/COMP SCI/ E M A/E P/M E 759</td>
<td>High Performance Computing for Applications in Engineering</td>
<td>3</td>
</tr>
<tr>
<td>COMP SCI 537</td>
<td>Introduction to Operating Systems</td>
<td>4</td>
</tr>
<tr>
<td>COMP SCI 758</td>
<td>Advanced Topics in Computer Architecture</td>
<td>3</td>
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</table>
| E&M Fields and Waves Sample Curriculum Path

Select 12 credits from the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
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</tr>
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<tbody>
<tr>
<td>E C E 447</td>
<td>Applied Communications Systems</td>
<td>3</td>
</tr>
<tr>
<td>E C E 545</td>
<td>Advanced Microwave Measurements for Communications</td>
<td>3</td>
</tr>
<tr>
<td>E C E 547</td>
<td>Advanced Communications Circuit Design</td>
<td>3</td>
</tr>
<tr>
<td>E C E 740</td>
<td>Electromagnetic Theory</td>
<td>3</td>
</tr>
<tr>
<td>E C E 742</td>
<td>Computational Methods in Electromagnetics</td>
<td>3</td>
</tr>
<tr>
<td>E C E 744</td>
<td>Theory of Microwave Circuits and Devices</td>
<td>3</td>
</tr>
<tr>
<td>E C E/PHYSICS 748</td>
<td>Linear Waves</td>
<td>3</td>
</tr>
<tr>
<td>E C E/N E/PHYSICS 749</td>
<td>Coherent Generation and Particle Beams</td>
<td>3</td>
</tr>
<tr>
<td>E C E 841</td>
<td>Antennas</td>
<td>3</td>
</tr>
<tr>
<td>E C E/PHYSICS 848</td>
<td>Nonlinear Waves</td>
<td>3</td>
</tr>
</tbody>
</table>

Energy and Power Systems Sample Curriculum Path

Select 12 credits from the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<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</td>
<td>3</td>
</tr>
<tr>
<td>E C E 427</td>
<td>Electric Power Systems</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>
<tr>
<td>E C E 511</td>
<td>Theory and Control of Synchronous Machines</td>
<td>3</td>
</tr>
<tr>
<td>E C E 711</td>
<td>Dynamics and Control of AC Machines</td>
<td>3</td>
</tr>
<tr>
<td>E C E 713</td>
<td>Electromagnetic Design of AC Machines</td>
<td>3</td>
</tr>
<tr>
<td>E C E 714</td>
<td>Utility Application of Power Electronics</td>
<td>3</td>
</tr>
<tr>
<td>E C E/</td>
<td>Digital System Design and Synthesis</td>
<td>3</td>
</tr>
<tr>
<td>COMP SCI 552</td>
<td>Introduction to Computer Architecture</td>
<td>3</td>
</tr>
<tr>
<td>E C E 553</td>
<td>Testing and Testable Design of Digital Systems</td>
<td>3</td>
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<td>Advanced Computer Architecture I</td>
<td>3</td>
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<tr>
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<td></td>
<td></td>
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<tr>
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<td>VLSI Systems Design</td>
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</tr>
<tr>
<td>COMP SCI 755</td>
<td></td>
<td></td>
</tr>
<tr>
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<td>Advanced Computer Architecture II</td>
<td>3</td>
</tr>
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| E&M Fields and Waves Sample Curriculum Path 1

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<tr>
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</tr>
<tr>
<td>E C E/PHYSICS 848</td>
<td>Nonlinear Waves</td>
<td>3</td>
</tr>
</tbody>
</table>
The on-campus program, not the online MSEE Power Engineering program.

Solid State/Photonics Sample Curriculum Path

Semiconductor Device and Fabrication Technology

Select 12 credits from the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>E C E 445</td>
<td>Semiconductor Physics and Devices</td>
<td>3</td>
</tr>
<tr>
<td>E C E 528</td>
<td>Plasma Processing and Technology</td>
<td>3</td>
</tr>
<tr>
<td>E C E 542</td>
<td>Introduction to Microelectromechanical Systems</td>
<td>3</td>
</tr>
<tr>
<td>E C E 548</td>
<td>Integrated Circuit Design</td>
<td>3</td>
</tr>
<tr>
<td>E C E 549</td>
<td>Integrated Circuit Fabrication Laboratory</td>
<td>3</td>
</tr>
<tr>
<td>E C E 745</td>
<td>Solid State Electronics</td>
<td>3</td>
</tr>
<tr>
<td>E C E 845</td>
<td>Transport in Semiconductor Devices</td>
<td>3</td>
</tr>
</tbody>
</table>

Photonics Technology

Select 12 credits from the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>E C E 434</td>
<td>Photonics</td>
<td>3</td>
</tr>
<tr>
<td>E C E 466</td>
<td>Electronic of Solids</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 740</td>
<td>Electromagnetic Theory</td>
<td>3</td>
</tr>
<tr>
<td>E C E 741</td>
<td>Semiconductor Diode Lasers and other Optoelectronic Devices</td>
<td>3</td>
</tr>
<tr>
<td>E C E 742</td>
<td>Computational Methods in Electromagnetics</td>
<td>3</td>
</tr>
<tr>
<td>E C E 747</td>
<td>Nanophotonics</td>
<td>3</td>
</tr>
</tbody>
</table>

Other Policy

Students in this program may not take courses outside the prescribed curriculum without faculty advisor and program director approval. Students in this program cannot enroll concurrently in other undergraduate or graduate degree programs.

Professional Development Activities

Students are strongly encouraged to participate in one of the professional development activities below:

- With assistance from Engineering Career Services, obtain a summer internship and enroll in up to 2 credits of E C E 702 Graduate Cooperative Education Program.
- Enroll in the summer course INTEREGR 601 Topics in Interdisciplinary Engineering.
- Enroll in up to 3 credits of E C E 699 Advanced Independent Study and be co-supervised by an advisor working in industry (choice of industry advisor is subject to program approval).
- Complete at least two of the online “Foundations of Professional Development” courses. Each course is eight weeks and 1 credit: