MASTER OF SCIENCE IN THE FIELD OF ELECTRICAL ENGINEERING

The Master of Science in electrical engineering, which is offered by the Department of Electrical and Computer Engineering, is designed to help students understand and apply the principles of electrical engineering to diverse areas such as communications, power and energy, and nanotechnology. It exposes students to the fundamentals of cutting edge topics such as sensors and Internet-of-Things, sustainable energy, wireless and optical networking, and telecommunications security. Students must choose from one of five areas of focus: (a) Applied Electromagnetics; (b) Communications and Networks; (c) Electrical Power and Energy; (d) Electronics, Photonics, and MEMS; or (e) Signal and Image Processing, Systems, and Controls.

Specific admission requirements are shown on the Graduate Program Finder (http://www.gwu.edu/all-graduate-programs).

More information is available on the departmental website (https://www.ece.seas.gwu.edu/master-science-electrical-engineering).

REQUIREMENTS

The following requirements must be fulfilled:

30 credits are required for the degree. Non-thesis and thesis options are available. For the thesis option, 6 of these credits are taken in ECE 6998 and ECE 6999. For either option, the student must select one focus area from the chart below and complete the specified number of credits for that area.

Colloquium requirement: In addition to required coursework, students must attend five non-credit bearing colloquia as part of their program of study. Each colloquium attended is verified by a faculty member also in attendance. After attending five colloquia, the student must submit to the department prior to applying for graduation a colloquium attendance form signed by the faculty advisor.

Communications and Networks

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td></td>
<td>Required</td>
<td></td>
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<tr>
<td>ECE 6015</td>
<td>Stochastic Processes in Engineering</td>
<td></td>
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<tr>
<td>ECE 6035</td>
<td>Introduction to Computer Networks</td>
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<tr>
<td>ECE 6510</td>
<td>Communication Theory</td>
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<td>At least two of the following:</td>
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<tr>
<td>ECE 6500</td>
<td>Information Theory</td>
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<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td></td>
<td>For thesis option</td>
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<tr>
<td>ECE 6998</td>
<td>Thesis Research</td>
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<tr>
<td>ECE 6999</td>
<td>Thesis Research</td>
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Electives*

Non-thesis option—15 credits in elective courses; thesis option—9 credits in elective courses. For either option, at least 3 credits must come from outside of the area of focus list.

Electrical Power and Energy

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td></td>
<td>Required</td>
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<tr>
<td>ECE 6060</td>
<td>Electric Power Generation</td>
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<td>At least two of the following:</td>
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<tr>
<td>ECE 6010</td>
<td>Linear Systems Theory</td>
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<td>ECE 6020</td>
<td>Applied Electromagnetics</td>
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<tr>
<td>ECE 6025</td>
<td>Signals and Transforms in Engineering</td>
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<td>At least three of the following:</td>
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<tr>
<td>ECE 6610</td>
<td>Electrical Energy Conversion</td>
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<tr>
<td>ECE 6620</td>
<td>Electrical Power Systems</td>
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<tr>
<td>ECE 6662</td>
<td>Power Electronics</td>
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</tr>
<tr>
<td>ECE 6666</td>
<td>Power System Transmission, Control, and Security</td>
<td></td>
</tr>
</tbody>
</table>
ECE 667 Nuclear Power Generation
ECE 668 Power Distribution Grids
ECE 669 Smart Power Grids
ECE 670 Power System Protection
ECE 690 Power Systems Economics
ECE 691 Power Systems Reliability
ECE 699 Energy and Sustainability

For thesis option
ECE 6998 Thesis Research
ECE 6999 Thesis Research

Electives*
Non-thesis option—12 credits in elective courses; thesis option—6 credits in elective courses. For either option, at least 3 credits must come from outside of the area of focus list.

Electronics, Photonics, and MEMS

Code | Title | Credits
--- | --- | ---
ECE 6030 | Device Electronics | Required
ECE 6213 | Design of VLSI Circuits | At least four of the following:
ECE 6214 | High-Level VLSI Design Methodology |
ECE 6215 | Introduction to MEMS |
ECE 6216 | RF/VLSI Circuit Design |
ECE 6218 | Advanced Analog VLSI Circuit Design |
ECE 6221 | Introduction to Physical Electronics |
ECE 6240 | VLSI Design and Simulation |
ECE 6245 | Micro- and Nanofabrication Technology |
ECE 6250 | ASIC Design and Testing of VLSI Circuits |
ECE 6260 | Introduction to Nanoelectronics |
ECE 6998 | Thesis Research |
ECE 6999 | Thesis Research |

Electives*
Non-thesis option—15 credits in elective courses; thesis option—9 credits in elective courses. For either option, at least 3 credits must come from outside of the area of focus list.

Signal and Image Processing, Systems and Controls

Code | Title | Credits
--- | --- | ---
ECE 6015 | Stochastic Processes in Engineering | Required

At least four of the following:
ECE 6005  Computer Architecture and Design
ECE 6010  Linear Systems Theory
ECE 6025  Signals and Transforms in Engineering
ECE 6666  Power System Transmission, Control, and Security
ECE 6800  Computational Techniques in Electrical Engineering
ECE 6810  Speech and Audio Processing by Computer
ECE 6815  Multimedia Processing
ECE 6820  Real-Time Digital Signal Processing
ECE 6825  Computer Control Systems
ECE 6830  System Optimization
ECE 6835  Nonlinear Systems
ECE 6840  Digital Image Processing
ECE 6842  Image Engineering
ECE 6845  Image Synthesis
ECE 6850  Pattern Recognition
ECE 6855  Digital Signal Processing Techniques
ECE 6860  Compression Techniques for Data, Speech, and Video
ECE 6865  Statistical Signal Estimation
ECE 6875  Wavelets and Their Applications
ECE 6880  Adaptive Signal Processing
ECE 6885  Computer Vision

For thesis option
ECE 6998  Thesis Research
ECE 6999  Thesis Research

Electives*

Non-thesis option—15 credits in elective courses; thesis option—9 credits in elective courses. For either option, at least 3 credits must come from outside of the area of focus list.

*Normally, no more than two courses taken outside the Department of Electrical and Computer Engineering may be counted toward the requirements for the degree. Courses taken outside the department must have prior approval from the student’s faculty advisor. In addition, no more than three 3000- or 4000-level ECE courses that have been approved for graduate credit may be counted toward the requirements for the degree.

Educational Planner

In consultation with an academic advisor, each student must develop an Educational Planner through DegreeMAP that governs the student's plan of study. The Educational Planner should be established soon after matriculation and must be completed before the end of the student's first semester. The Educational Planner must be approved by the advisor.

Additional program requirements can be found on the Department of Electrical and Computer Engineering Master's Degree requirements (https://www.ece.seas.gwu.edu/masters-program-degree-requirements) webpage.