The Master of Science in the field of electrical engineering is designed to help students understand and apply the principles of the field to diverse areas such as communications, power and energy, and micro- and nano-electronics. Students may choose from the following five areas of focus: communications and networks; electrical power and energy; applied electromagnetics; electronics, photonics, and MEMS; and signal and image processing, systems and controls.

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

Visit the program website (http://www.ece.seas.gwu.edu/master-science-electrical-engineering) for additional information.

**REQUIREMENTS**

The following requirements must be fulfilled: 30 credits, including the number of required and elective credits determined by the selected focus area. Thesis and non-thesis options are available.

Additional requirements found on the Department of Electrical and Computer Engineering Master’s Degree requirements (http://www.ece.seas.gwu.edu/node/148) webpage.

Students select one of the following five areas of focus: communications and networks; electrical power and energy; applied electromagnetics; electronics, photonics, and MEMS; and signal and image processing, systems, and controls.

**Communications and Networks**

**Required**

- ECE 6015 Stochastic Processes in Engineering
- ECE 6035 Introduction to Computer Networks
- ECE 6510 Communication Theory I
- ECE 6065 Colloquium

Two of the following:

- ECE 6500 Information Theory
- ECE 6505 Error Control Coding
- ECE 6520 Mobile & Wireless Comm Systems
- ECE 6525 Satellite Communication Systems
- ECE 6530 Electronic Warfare

**Electives**

- ECE 6550 Advanced Network Architectures
- ECE 6555 Networks Protocols
- ECE 6560 Network Performance Analysis
- ECE 6565 Telecommunications Security
- ECE 6570 Telecommunications Security Protocols
- ECE 6575 Optical Communication Networks
- ECE 6580 Wireless Networks

**Electrical Power and Energy**

**Required**

- ECE 6010 Linear Systems Theory
- ECE 6020 Applied Electromagnetics
- ECE 6060 Electric Power Generation
- ECE 6065 Colloquium

Three of the following:

- ECE 6025 Signals and Transforms in Engineering
- ECE 6610 Electrical Energy Conversion
- ECE 6620 Electrical Power Systems
- ECE 6662 Power Electronics
- ECE 6666 Power System Transmission, Control, and Security
- ECE 6667 Nuclear Power Generation
- ECE 6668 Power Distribution Grids
- ECE 6669 Smart Power Grids
- ECE 6670 Power System Protection
- ECE 6690 Power Systems Economics
- ECE 6691 Power Systems Reliability

**Electives**

- ECE 6560 Network Performance Analysis
- ECE 6565 Telecommunications Security
- ECE 6570 Telecommunications Security Protocols
- ECE 6575 Optical Communication Networks
- ECE 6580 Wireless Networks

15 credits in elective courses. Normally, no more than two courses taken outside the Department of Electrical and Computer Engineering may be counted toward the requirements for the degree.
12 credits in elective courses. Normally no more than two courses taken outside the Department of Electrical and Computer Engineering may be counted toward the requirements for the degree.

### Applied Electromagnetics

**Required**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE 6020</td>
<td>Applied Electromagnetics</td>
</tr>
<tr>
<td>ECE 6065</td>
<td>Colloquium</td>
</tr>
<tr>
<td>ECE 6710</td>
<td>Microwave Engineering</td>
</tr>
<tr>
<td>ECE 6715</td>
<td>Antennas</td>
</tr>
</tbody>
</table>

One of the following:

- ECE 6720 Remote Sensing
- ECE 6725 Electromagnetic Radiation and Scattering
- ECE 6730 Waves in Random Media
- ECE 6735 Numerical Electromagnetics
- ECE 6745 Analysis of Nonlinear and Multivalued Devices
- ECE 6750 Introduction to Radar Systems
- ECE 6760 Propagation Modeling in Wireless Communications
- ECE 6765 Photonics and Fiber Optics
- ECE 6770 Applied Magnetism

### Electives

18 credits in elective courses. Normally no more than two courses taken outside the Department of Electrical and Computer Engineering may be counted toward the requirements for the degree.

### Signal and Image Processing, Systems and Controls

**Required**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE 6015</td>
<td>Stochastic Processes in Engineering</td>
</tr>
<tr>
<td>ECE 6065</td>
<td>Colloquium</td>
</tr>
</tbody>
</table>

Four of the following:

- 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 DSP
- ECE 6825 Computer Control Systems
- ECE 6830 System Optimization
- ECE 6835 Nonlinear Systems
- ECE 6840 Digital Image Processing
- ECE 6842 Image Engineering

Electronics, Photonics, and MEMS

**Required**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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<tbody>
<tr>
<td>ECE 6030</td>
<td>Device Electronics</td>
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<tr>
<td>ECE 6065</td>
<td>Colloquium</td>
</tr>
</tbody>
</table>

Four of the following:

- ECE 6213 Design of VLSI Circuits
- 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 6223 Introduction to Nanotechnology
- ECE 6240 VLSI Design and Simulation
- ECE 6245
- ECE 6250 ASIC Design and Testing of VLSI Circuits
- ECE 6260 Introduction to Nano-electronics
- ECE 6265

Electives

15 credits in elective courses. Normally no more than two courses taken outside the Department of Electrical and Computer Engineering may be counted toward the requirements for the degree.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>ECE 6845</td>
<td>Image Synthesis</td>
</tr>
<tr>
<td>ECE 6850</td>
<td>Pattern Recognition</td>
</tr>
<tr>
<td>ECE 6855</td>
<td>Digital Signal Processing Techniques</td>
</tr>
<tr>
<td>ECE 6860</td>
<td>Compression Techniques for Data, Speech, and Video</td>
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<tr>
<td>ECE 6865</td>
<td>Statistical Signal Estimation</td>
</tr>
<tr>
<td>ECE 6875</td>
<td>Wavelets and Their Applications</td>
</tr>
<tr>
<td>ECE 6880</td>
<td>Adaptive Signal Processing</td>
</tr>
<tr>
<td>ECE 6885</td>
<td>Computer Vision</td>
</tr>
</tbody>
</table>

**Electives**

15 credits in elective courses. Normally no more than two courses taken outside the Department of Electrical and Computer Engineering may be counted toward the requirements for the degree.