MASTER OF SCIENCE IN THE FIELD OF COMPUTER ENGINEERING (STEM)

Students in the computer engineering master’s program learn sophisticated computer architecture and integrated circuit design techniques using industry-standard computer-aided design tools. The master’s program offers a flexible schedule that includes late afternoon and evening classes as well as the ability to choose a thesis or non-thesis degree option.

Students acquire up-to-date knowledge and skills in the advances of computer systems architecture and networking, and in the rapidly growing use of superscalar microprocessors, real-time embedded systems, VLSI and ASIC design modules, digital signal processors, and networked computing platforms.

This is a STEM designated program.

Visit the departmental website (https://www.ece.seas.gwu.edu/master-science-computer-engineering/) for additional information.

ADMISSIONS

Admission deadlines:
- Fall - January 15
- Spring - September 1
- Summer - March 1 (non-F1 visa seeking applicants)

Standardized test scores: The Graduate Record Examination (GRE) is required of all applicants. (Institution code 5246). Average scores for our Fall 2014 incoming class were: 161 (Q), 148 (V), and 3 (W).

The Test of English as a Foreign Language (TOEFL), the academic International English Language Testing System (IELTS), or the PTE Academic is required of all applicants except those who hold a bachelor’s, master’s, or doctoral degree from a college or university in the United States or from an institution located in a country in which English is the official language, provided English was the language of instruction. Minimum scores:
- Academic IELTS: an overall band score of 6.0 with no individual score below 5.0; applicants requesting funding consideration must have an overall band score of 7.0 with no individual score below 6.0; or
- TOEFL: 550 on paper-based or 80 on Internet-based; applicants requesting funding consideration must have 600 on paper-based; or 100 on Internet-based; or
- PTE Academic: 53; applicants requesting funding consideration must have 68.

Recommendations: (2) recommendations required. If possible, one recommendation should be from your advisor at the institution from which you earned your highest degree.

Prior academic records: Transcripts are required from all colleges and universities attended, whether or not credit was earned, the program was completed, or the credit appears as transfer credit on another transcript. Unofficial transcripts from all colleges and universities attended must be uploaded to your online application. Official transcripts are required only of applicants who are offered admission.

If academic records are in a language other than English, a copy in the original language and an English language translation must be uploaded. Transcript evaluations should not be uploaded. Applicants who have earned a degree from an Indian university are required to submit individual semester mark sheets.

Statement of purpose: In an essay of 250 to 500 words, state your purpose in undertaking graduate study at The George Washington University; describe your academic objectives, research interests, and career plans; and discuss your related qualifications, including collegiate, professional, and community activities, and any other substantial accomplishments not already mentioned.

Additional requirements: Applicant must possess a B.S. in biomedical engineering, electrical engineering, computer engineering, or computer science with a grade point average of at least 3.0 (on a scale of 4.0) for the last 60 credits of undergraduate work. Students with a B.S. in another field may be admitted with a set of deficiency courses to be determined by the department.

All applicants must choose an area of focus that most closely matches their interests and note this on the online application. All applicants must submit a résumé or CV.

International applicants only: Please follow this link - https://graduate.admissions.gwu.edu/international-student-application-requirements (https://graduate.admissions.gwu.edu/international-student-application-requirements/) - to review the International Applicant Information carefully for details on required documents, earlier deadlines for applicants requiring an I-20 or DS-2019 from GW, and English language requirements.

For additional information about the admissions process visit the SEAS Admissions Frequently Asked Questions (https://graduate.engineering.gwu.edu/admissions-frequently-asked-questions/) page.

Contact for questions:
engineering@gwu.edu
202-994-1802 (phone)
202-994-1651 (fax)
Hours: 9:00 am to 5:00 pm, Monday through Friday
The following requirements must be fulfilled:

**Thesis option**—30 credits, including all requirements in one focus area and 6 credits in thesis. **Non-thesis option**—30 credits taken in one focus 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 and prior to applying for graduation, a student must submit a colloquium attendance form, signed by the faculty advisor, to the department.

### Focus areas

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td><strong>Computer architecture and high-performance computing focus area</strong></td>
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<tr>
<td>Required</td>
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<tr>
<td>ECE 6005</td>
<td>Computer Architecture and Design</td>
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<tr>
<td>At least five courses selected from the following:</td>
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<tr>
<td>ECE 6105</td>
<td>Introduction to High-Performance Computing</td>
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<tr>
<td>ECE 6120</td>
<td>Advanced Microarchitecture</td>
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<tr>
<td>ECE 6125</td>
<td>Parallel Computer Architecture</td>
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<tr>
<td>ECE 6130</td>
<td>Big Data and Cloud Computing</td>
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<tr>
<td>ECE 6140</td>
<td>Embedded Systems</td>
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<tr>
<td>ECE 6150</td>
<td>Design of Interconnection Networks for Parallel Computer Architectures</td>
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<tr>
<td>ECE 6160</td>
<td>Secure Computing Systems</td>
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<tr>
<td>ECE 8150</td>
<td>Advanced Topics in Computer Architecture</td>
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<tr>
<td>For thesis option</td>
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<tr>
<td>ECE 6998</td>
<td>Thesis Research I</td>
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<tr>
<td>ECE 6999</td>
<td>Thesis Research II</td>
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<tr>
<td>Electives*</td>
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<tr>
<td>Non-thesis option—6 credits in elective courses, 3 of which must come from outside of the area of focus list; thesis option—0 credits in elective courses.</td>
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<tr>
<td><strong>Machine learning and intelligent systems focus area</strong></td>
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<tr>
<td>ECE 6160</td>
<td>Secure Computing Systems</td>
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<tr>
<td>ECE 6210</td>
<td>Machine Intelligence</td>
<td></td>
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<tr>
<td>ECE 6882</td>
<td>Reinforcement Learning</td>
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<td>At least two courses selected from the following:</td>
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<tr>
<td>ECE 6015</td>
<td>Stochastic Processes in Engineering</td>
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<tr>
<td>ECE 6120</td>
<td>Advanced Microarchitecture</td>
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<td>Parallel Computer Architecture</td>
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<tr>
<td><strong>MEMS, electronics, and photonics focus area</strong></td>
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<td>Required</td>
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<tr>
<td>ECE 6030</td>
<td>Device Electronics</td>
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<td>Four courses selected from the following:</td>
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<tr>
<td>ECE 6020</td>
<td>Applied Electromagnetics</td>
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<tr>
<td>ECE 6210</td>
<td>Machine Intelligence</td>
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<tr>
<td>ECE 6213</td>
<td>Design of VLSI Circuits</td>
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<td>ECE 6214</td>
<td>High-Level VLSI Design Methodology</td>
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<td>ECE 6215</td>
<td>Microsystems Design, Simulation, and Fabrication for Sensor Applications</td>
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<td>RF/VLSI Circuit Design</td>
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<tr>
<td>ECE 6217</td>
<td>Neural Networks and Hardware Implementations</td>
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<td>ECE 6218</td>
<td>Advanced Analog VLSI Circuit Design</td>
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<tr>
<td>ECE 6221</td>
<td>Introduction to Physical Electronics</td>
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<tr>
<td>ECE 6240</td>
<td>VLSI Design and Simulation</td>
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<tr>
<td>ECE 6245</td>
<td>Microfabrication and Nanofabrication Technology</td>
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<td>ECE 6250</td>
<td>ASIC Design and Testing of VLSI Circuits</td>
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<tr>
<td>ECE 6255</td>
<td>Sensors, Networks, and Applications</td>
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<tr>
<td>ECE 6260</td>
<td>Introduction to Nanoelectronics</td>
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<tr>
<td>ECE 6710</td>
<td>Microwave Engineering</td>
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<td>ECE 6715</td>
<td>Antennas</td>
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<tr>
<td>ECE 6745</td>
<td>Analysis of Nonlinear and Multivalued Devices</td>
</tr>
<tr>
<td>ECE 6761</td>
<td>Light and Information</td>
</tr>
<tr>
<td>ECE 6765</td>
<td>Photonics and Fiber Optics</td>
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<td>ECE 6770</td>
<td>Applied Magnetism</td>
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</table>

For thesis option

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<tr>
<td>ECE 6999</td>
<td>Thesis Research II</td>
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</tbody>
</table>

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 faculty advisor. In addition, no more than three 3000- or 4000-level ECE courses eligible for graduate credit may be counted toward requirements for the degree.

**Required for students who have not taken a course in probability and random processes at the undergraduate level or above.

**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.

Visit the program website (https://www.ece.seas.gwu.edu/graduate-programs/) for additional information.