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 GRE General Test is optional for all applicants. For applicants who want to submit scores, they must be submitted officially from ETS using the institutional code 5246.
	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 6.5 with no individual score below 6.0; or
	- TOEFL: 550 on paper-based or 81 on Internet-based; or
	- PTE Academic: 53; applicants requesting funding consideration must have 68.
Recommendations required:	Two (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 marksheets.
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 resumé 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

REQUIREMENTS

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 in-person, non-credit bearing colloquia as part of their program of study. At least two of these colloquia must be attended in the first two semesters. 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 to the department a colloquium attendance form signed by the faculty advisor.

Focus areas

Code	Title	Credits
Computer architecture and high-performance computing focus area		
Required		
ECE 6005	Computer Architecture and Design	
At least five courses selected from the following:		
ECE 6105	Introduction to High-Performance Computing	
ECE 6120	Advanced Microarchitecture	
ECE 6125	Parallel Computer Architecture	
ECE 6130	Big Data and Cloud Computing	
ECE 6140	Embedded Systems	
ECE 6150	Design of Interconnection Networks for Parallel Computer Architectures	
ECE 6160	Secure Computing Systems	
ECE 8150	Advanced Topics in Computer Architecture	
For thesis option		
ECE 6998	Thesis Research I	
ECE 6999	Thesis Research II	
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.

Code	Title	Credits
Hardware and Systems Security focus area		
Required		
ECE 6005	Computer Architecture and Design	
ECE 6045	Special Topics in Electrical Engineering	
ECE 6125	Parallel Computer Architecture	
ECE 6150	Design of Interconnection Networks for Parallel Computer Architectures	
ECE 6160	Secure Computing Systems	
At least three courses selected from the following:		
ECE 6105	Introduction to High-Performance Computing	
ECE 6120	Advanced Microarchitecture	
ECE 6130	Big Data and Cloud Computing	
ECE 6134	Cloud Computing and Security	
ECE 6565	Network Security	
ECE 6570	Telecommunications Security Protocols	
ECE 8150	Advanced Topics in Computer Architecture	
For thesis option		
ECE 6998	Thesis Research I	
ECE 6999	Thesis Research II	
Electives*		

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

Code	Title	Credits
High-Performance Data Analytics focus area		
Required		
ECE 6005	Computer Architecture and Design	
ECE 6105	Introduction to High-Performance Computing	
ECE 6120	Advanced Microarchitecture	
ECE 6125	Parallel Computer Architecture	
ECE 6130	Big Data and Cloud Computing	

ECE 6150	Design of Interconnection Networks for Parallel Computer Architectures
At least two courses selected from the following:	
ECE 6045	Special Topics in Electrical Engineering
ECE 6160	Secure Computing Systems
ECE 6210	Machine Intelligence
ECE 8150	Advanced Topics in Computer Architecture
For thesis option	
ECE 6998	Thesis Research I
ECE 6999	Thesis Research II
Electives*	
Non-thesis option – 6 credits in elective courses. At least 3 credits must come from outside of the area of focus list.	

Code	Title	Credits
Machine learning and intelligent systems focus area		
Required		
ECE 6005	Computer Architecture and Design	
ECE 6105	Introduction to High-Performance Computing	
ECE 6130	Big Data and Cloud Computing	
ECE 6160	Secure Computing Systems	
ECE 6210	Machine Intelligence	
ECE 6882	Reinforcement Learning	
At least two courses selected from the following:		
ECE 6015	Stochastic Processes in Engineering **	
ECE 6120	Advanced Microarchitecture	
ECE 6125	Parallel Computer Architecture	
ECE 6150	Design of Interconnection Networks for Parallel Computer Architectures	
For thesis option		
ECE 6998	Thesis Research I	
ECE 6999	Thesis Research II	
Electives*		
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.		

Code	Title	Credits
MEMS, electronics, and photonics focus area		
Required		
ECE 6030	Device Electronics	
Four courses selected from the following:		
ECE 6020	Applied Electromagnetics	
ECE 6210	Machine Intelligence	
ECE 6213	Design of VLSI Circuits	
ECE 6214	High-Level VLSI Design Methodology	
ECE 6215	Microsystems Design, Simulation, and Fabrication for Sensor Applications	
ECE 6216	RF/VLSI Circuit Design	
ECE 6217	Neural Networks and Hardware Implementations	
ECE 6218	Advanced Analog VLSI Circuit Design	
ECE 6221	Introduction to Physical Electronics	
ECE 6240	VLSI Design and Simulation	
ECE 6245	Microfabrication and Nanofabrication Technology	
ECE 6250	ASIC Design and Testing of VLSI Circuits	
ECE 6255	Sensors, Networks, and Applications	
ECE 6260	Introduction to Nanoelectronics	
ECE 6710	Microwave Engineering	
ECE 6715	Antennas	
ECE 6745	Analysis of Nonlinear and Multivalued Devices	
ECE 6761	Light and Information	
ECE 6765	Photonics and Fiber Optics	
ECE 6770	Applied Magnetism	
For thesis option		
ECE 6998	Thesis Research I	
ECE 6999	Thesis Research II	

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 can 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.

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