BACHELOR OF SCIENCE WITH A MAJOR IN ELECTRICAL ENGINEERING (STEM)

Electrical engineering provides the technological foundation for the modern information society. Almost every modern technological advance made today can be traced to the work of electrical engineers. Students in George Washington University's electrical engineering program discover the basics of electrical engineering design, allowing them to take their place alongside the engineers who make daily advances in sustainable energy, telecommunications, healthcare, defense, and other sectors. The program's contemporary curriculum is complemented by well-staffed and well-equipped laboratories. Students can access real-world projects through internships and gain practical design sequence experiences by being prepared in a wide variety of technical fields. Graduates have gone on to have careers at Tesla, Intel, Google, AT&T, Qualcomm, NASA, and Cisco.

Double major

SEAS and non-SEAS students interested in pursuing the BS in electrical engineering as a double major should see the requirements under SEAS Regulations (https://bulletin.gwu.edu/engineering-applied-science/#seasregulationstext) in this Bulletin.

This is a STEM designated program.

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

ADMISSIONS

Visit the Office of Undergraduate Admissions website (https://undergraduate.admissions.gwu.edu/) for information about the admission process. Applications can be submitted via the Common Application (https://go.gwu.edu/commonapp).

Supporting documents not submitted online should be mailed to:
Office of Undergraduate Admissions
The George Washington University
800 21st Street NW, Suite 100
Washington DC 20052

Contact for questions:
gwadm@gwu.edu or 202-994-6040

REQUIREMENTS

This Bulletin covers the degree requirements for students matriculating in the current academic year. Students who matriculated before the current year can find their requirements in the relevant archived Bulletin (http://archives/).

The following requirements must be fulfilled:

129 credits as outlined below in required and elective courses, including completion of a 3-course, 9-credit specialized track.

A minimum technical GPA of 2.2 and SEAS GPA of 2.0. A student's technical GPA is calculated using all technical engineering courses outlined in the fifth, sixth, seventh, and eighth semesters of the curriculum.

Recommended program of study

The program of study lists all course requirements in the sequence for the degree. Students should review this information carefully and consult their advisor before changing the sequence of any courses.

Code	Title	Credits
First semester		
CHEM 1111	General Chemistry I [1,5]	
ECE 1010	Introduction to Electrical and Computer Engineering I	
MATH 1231	Single-Variable Calculus I [1]	
SEAS 1001	Engineering Orientation	
Two humanities, social science, or non-technical elective [2]		
Second semester		
ECE 1020	Introduction to Electrical and Computer Engineering II	
ECE 1120	C Programming for Electrical and Computer Engineering	
MATH 1232	Single-Variable Calculus II [1]	
PHIL 2135	Ethics in Business and the Professions	
PHYS 1021	University Physics I [1]	
or PHYS 1025	University Physics I with Biological Applications	
UW 1020	University Writing [1]	
Third semester		
APSC 2113	Engineering Analysis I	
ECE 1125	Data Structures and Algorithms for ECE	
ECE 2110	Circuit Theory	
ECE 2120	Engineering Seminar	
MATH 2233	Multivariable Calculus [1]	
PHYS 1022	University Physics II [1]	
or PHYS 1026	University Physics II with Biological Applications	
Fourth semester		
APSC 2114	Engineering Analysis II	

ECE 2115	Engineering Electronics
ECE 2140	Design of Logic Systems
ECE 2210	Circuits, Signals, and Systems
Humanities, social science, or non-technical elective [2]	
Fifth semester	
APSC 3115	Engineering Analysis III
ECE 3130	Digital Electronics and Design
ECE 3220	Introduction to Digital Signal Processing
ECE 3315	Fields and Waves I
ECE 3520	Microprocessors: Software, Hardware, and Interfacing
Sixth semester	
ECE 3125	Analog Electronics Design
ECE 3135	Digital Design with Field-Programmable Gate Arrays
ECE 3410	Communications Engineering
ECE 3915W	Electrical and Computer Engineering Capstone Project Lab I
ECE 4320	Fields and Waves II
Seventh semester	
ECE 4710	Control Systems Design
ECE 4920W	Electrical and Computer Engineering Capstone Project Lab II
One technical elective [3]	
Two ECE restricted electives [4]	
Eighth semester	
ECE 4610	Electrical Energy Conversion
ECE 4925W	Electrical and Computer Engineering Capstone Project Lab III
Humanities, social science, or non-technical elective [2]	
Two technical electives [3]	
Track requirement	
Students complete one specialized track of three courses (for a minimum of 9 credits) from the options listed below. Requirements for the track can be completed using technical elective courses or ECE restricted elective courses. [3,4]	

Track 1: Electronics, nanotechnology, and chip design	
Three courses selected from the following with the advisor's approval:	
ECE 4140	VLSI Design and Simulation
ECE 4145	Microfabrication and Nanofabrication Technology
ECE 4150	ASIC Design and Testing of VLSI Circuits
ECE 4160	Introduction to Nanoelectronics
ECE 4435	Photonics and Fiber Optics
ECE 4535	Computer Architecture and Design
ECE 6221	Introduction to Physical Electronics
Track 2: Artificial intelligence and robotics	
ECE 4810	Machine Intelligence
And two technical elective courses selected from the following with the advisor's approval:	
ECE 4730	Robotic Systems
ECE 4535	Computer Architecture and Design
ECE 6217	Neural Networks and Hardware Implementations
ECE 6850	Pattern Recognition and Machine Learning
ECE 6882	Reinforcement Learning
BME 3720	BME Programming II: Introduction to Assistive Robotics
Track 3: Telecommunication and network security	
Three courses selected from the following with the advisor's approval:	
ECE 3525	Introduction to Embedded Systems
ECE 4415	Introduction to Computer Networks
ECE 4425	Data Communications Laboratory
ECE 6160	Secure Computing Systems
ECE 6565	Network Security
ECE 6575	Optical Communication Networks
ECE 6580	Wireless Networks
Track 4: Sustainable energy and power systems	
ECE 4620	Electrical Power Systems

And two technical elective courses selected from the following with the advisor's approval:	
ECE 4662	Power Electronics
ECE 6699	Energy and Sustainability
MAE 2131	Thermodynamics
Track 5: Electrical engineering general track	
Three technical elective courses selected with the advisor's approval to align with track's overall academic goals.	

[1]Course satisfies the University general education requirement (https://bulletin.gwu.edu/university-regulations/general-education/) in math, science, and writing.

[2]All electrical and computer engineering students take five courses to satisfy the ECE humanities and social science/non-technical requirement. Three of these courses—one in humanities and two in social sciences—must be on the University general education requirement list; one course must be PHIL 2135 Ethics in Business and the Professions (or NSC 4176 Leadership and Ethics for students in the NROTC Program); and one course can be in the humanities/social sciences, or a non-technical course related to public health, safety, and welfare; global cultural, social, environmental, and economic factors; or innovation, entrepreneurship, and creativity. For the last category, students can consider taking DNSC 1051 Introduction to Business Analytics, DNSC 4404 Essentials of Project Management, EMSE 4410 Engineering Economic Analysis, ISTM 4223 Technology Entrepreneurship MGT 3300 Entrepreneurship, MGT 3301 Small Business Management, MGT 3302 e-Entrepreneurship, MGT 3303 Women's Entrepreneurial Leadership, or MGT 4003. The non-technical course cannot focus on scientific/mathematical approaches or technology. All courses selected to satisfy this requirement must be taken for a minimum of 3 credits and approved by the advisor.

[3]Three 3-credit technical elective courses must be selected with the approval of the advisor from upper-division undergraduate (2000 to 4000 level) or graduate courses in engineering, computer science, mathematics, physical sciences, or biological sciences. Exceptions must be approved by the advisor. Technical elective courses can be used to fulfill the track requirement. See above.

[4]The two ECE restricted electives must be selected with the approval of the advisor from ECE courses at the 3000 level or above. Exceptions must be approved by the advisor. ECE elective courses can be used to fulfill the track requirement. See above.

[5]Students can take CHEM 1113 General Chemistry for Engineers instead of CHEM 1111 with consultation from ECE advisors.

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Correction: BME 3720 replaced BME 4835 as the latter is not currently offered. This is a correction, not a change in the degree requirements. October 2, 2025.

COMBINED PROGRAMS

Combined programs

- Dual Bachelor of Science with a major in electrical engineering and Master of Science in the field of computer engineering (https://bulletin.gwu.edu/engineering-applied-science/electrical-computer-engineering/combined-bs-electrical-engineering-ms-computer-engineering/)
- Dual Bachelor of Science with a major in electrical engineering and Master of Science in the field of electrical engineering (https://bulletin.gwu.edu/engineering-applied-science/electrical-computer-engineering/combined-bs-ms-electrical-engineering/)