

# BACHELOR OF SCIENCE WITH A MAJOR IN SYSTEMS ENGINEERING (STEM)

The Systems Engineering program at GW is designed to provide a broad and solid education in the basics of mathematical modeling, software and information systems, and the treatment of uncertainty. In this program, you learn to apply engineering techniques and mathematical methods to assist decision makers in designing and operating systems optimally. You learn to do this by observing, understanding, modeling, and predicting the behavior of the systems that naturally arise in fields as diverse as medicine, defense, manufacturing, and management. Students take part in professional societies—such as GW's student chapter of INFORMS (Institute for Operations Research and the Management Sciences)—and have multiple opportunities to connect with our alumni network, leading to internships. With a broad array of options open to systems engineers, students have gone on to intern as well as start their careers in many fields, including communications, energy, environment, finance, health care, information technology, marketing, national defense, project management, software development, or transportation.

## Double major

SEAS and non-SEAS students interested in pursuing the BS in systems engineering as a double major should see Double Major 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.emse.seas.gwu.edu/bachelor-arts-applied-science-technology/>) for additional information.

## ADMISSIONS

For more information on the admission process, please visit the Office of Undergraduate Admissions website (<https://undergraduate.admissions.gwu.edu/>). Applications may 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](mailto:gwadm@gwu.edu) or 202-994-6040

## REQUIREMENTS

The following requirements must be fulfilled:

- Completion of a total of 129 credits as outlined below.
- Completion of an appropriate internship/co-op experience during the last two years of the program. This requirement may be satisfied by an approved full-time summer position after the second or third year, or by one or two approved part-time positions requiring 15 to 20 hours of work per week during two of the final four semesters. The position may be paid or unpaid. A position obtained through the GW Center for Career Services (<https://careerservices.gwu.edu/>) usually is acceptable. Consult the faculty advisor for approval.
- A minimum technical GPA of 2.2 and SEAS GPA of 2.0. All technical courses taken during the fifth through eighth semesters, as outlined by the 4-year curriculum sheet respective to each major and approved by the student's faculty advisor, are counted towards the student's technical GPA.
- Completion of an approved technical minor that uses the five professional elective courses built into the curriculum.

Code	Title	Credits
<b>Recommended program of study</b>		
The plan of study lists in sequence all course requirements for the degree. Students should review this information carefully and speak to their advisor before changing the sequence of any of these courses.		
<b>First semester</b>		
EMSE 1001	Introduction to Systems Engineering	1
SEAS 1001	Engineering Orientation	1
COMM 1040	Public Communication	3
CSCI 1012	Introduction to Programming with Python <sup>3</sup>	3
MATH 1231	Single-Variable Calculus I <sup>1</sup>	3
Science elective <sup>2</sup>		4
<b>Second semester</b>		
ECON 1011	Principles of Economics I <sup>1</sup>	3
EMSE 4571	Introduction to Programming for Analytics	3
MATH 1232	Single-Variable Calculus II <sup>1</sup>	3
PHYS 1021	University Physics I	4
UW 1020	University Writing	4
<b>Third semester</b>		
APSC 3115	Engineering Analysis III	3
EMSE 2801	Fundamentals of Systems Engineering	3
EMSE 4572	Exploratory Data Analysis	3

MATH 2233	Multivariable Calculus <sup>1</sup>	3	STAT 2183W	Intermediate Statistical Laboratory: Statistical Computing Packages	3
PHYS 1022	University Physics II	4	Three professional electives <sup>6</sup>		9
<b>Fourth semester</b>					
EMSE 2705	Mathematics of Operations Research	3			
EMSE 3815	Requirements Analysis and Elicitation	3			
EMSE 4765	Data Analysis for Engineers and Scientists	3			
Humanities elective <sup>4</sup>		3			
PHIL 2135	Ethics in Business and the Professions	3			
<b>Fifth semester</b>					
APSC 2113	Engineering Analysis I	3			
EMSE 3740W	Systems Thinking and Policy Modeling	3			
EMSE 3850	Quantitative Models in Systems Engineering	3			
EMSE 4755	Quality Control and Acceptance Sampling	3			
Social sciences elective <sup>4</sup>		3			
EMSE Focus Area Elective 1 <sup>5</sup>		3			
<b>Sixth semester</b>					
EMSE 3820	Project Management for Engineering Systems	3			
EMSE 3855W	Critical Infrastructure Systems	3			
EMSE 4410	Engineering Economic Analysis	3			
EMSE 4770	Techniques of Risk Analysis and Management	3			
EMSE Focus Area Elective 2 <sup>5</sup>		3			
Professional Elective 1 <sup>6</sup>		3			
<b>Seventh semester</b>					
EMSE 3760	Discrete Systems Simulation	3			
EMSE 4190	Senior Project in Systems Engineering I	3			
EMSE 4710	Applied Optimization Modeling	3			
EMSE Focus Area Elective 3 <sup>5</sup>		3			
Professional Elective 2 <sup>6</sup>		3			
<b>Eighth semester</b>					
EMSE 4191	Senior Project in Systems Engineering II	3			
<b>Total Credits</b>					<b>129</b>

<sup>1</sup>Course satisfies the University General Education (<https://bulletin.gwu.edu/university-regulations/general-education/>) requirement in math, science, and writing.

<sup>2</sup> One 4-credit course selected from the following for a total of 4 credits: BISC 1111, BISC 1112, CHEM 1111, or CHEM 1112.

<sup>3</sup> Other programming courses, such as CSCI 1111, CSCI 1112, or ECE 1120, may be substituted with the advisor's approval.

<sup>4</sup> One social and behavioral sciences course and one humanities course must be selected from the University General Education Requirement (<https://bulletin.gwu.edu/university-regulations/general-education/>) list.

<sup>5</sup> In consultation with the faculty advisor, the student selects three approved courses from a single focus area from the Department of Engineering Management and Systems Engineering.

<sup>6</sup> Professional electives: Each systems engineering major will gain specific expertise in a chosen technical area by taking a sequence of courses leading to a minor from another department of the University. Professional electives are selected with the approval of the student's academic advisor to satisfy the minor requirements. Areas frequently chosen are computer science, economics, finance, management, mathematics, naval science, statistics, or specific fields of engineering. Consult the advisor for other approved areas and requirements.

**Internship requirement**—All EMSE majors are required to complete an appropriate internship/co-op experience during the last two years of the program. This requirement may be satisfied by an approved full-time summer position after the second or third year, or by one or two approved part-time positions requiring 15 to 20 hours per week during two of the final four semesters. A position obtained through the GW Career Center (<https://careerservices.gwu.edu>) will usually be acceptable; the position may be either paid or unpaid. Consult the advisor for approval.