

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 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 |
|------|-------|---------|
|------|-------|---------|

Recommended program of study

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.

First semester

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|-------------------------------|------------------------------------------------------|---|
| EMSE 1001 | Introduction to Systems Engineering | 1 |
| MATH 1231 | Single-Variable Calculus I ¹ | 3 |
| SEAS 1001 | Engineering Orientation | 1 |
| UW 1020 | University Writing ¹ | 4 |
| Science elective ² | | 4 |
| CSCI 1012 | Introduction to Programming with Python ³ | 3 |

Second semester

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|--------------|-------------------------------------------|---|
| COMM 1040 | Public Communication | 3 |
| or COMM 1041 | Interpersonal Communication | |
| or COMM 1042 | Business and Professional Speaking | |
| ECON 1011 | Principles of Economics I ¹ | 3 |
| EMSE 4571 | Introduction to Programming for Analytics | 3 |
| MATH 1232 | Single-Variable Calculus II ¹ | 3 |
| PHYS 1021 | University Physics I | 4 |

Third semester

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|-----------|--------------------------|---|
| APSC 3115 | Engineering Analysis III | 3 |
|-----------|--------------------------|---|

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|-----------------------------------------|--------------------------------------------|---|
| EMSE 2801 | Fundamentals of Systems Engineering | 3 |
| EMSE 4572 | Exploratory Data Analysis | 3 |
| MATH 2233 | Multivariable Calculus ¹ | 3 |
| PHYS 1022 | University Physics II | 4 |
| Fourth semester | | |
| 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 ⁴ | | 3 |
| PHIL 2135 | Ethics in Business and the Professions | 3 |
| Fifth semester | | |
| 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 ⁴ | | 3 |
| EMSE Focus Area Elective 1 ⁵ | | 3 |
| Sixth semester | | |
| 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 ⁵ | | 3 |
| Professional Elective 1 ⁶ | | 3 |
| Seventh semester | | |
| 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 ⁵ | | 3 |
| Professional Elective 2 ⁶ | | 3 |
| Eighth semester | | |

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|-------------------------------------------|---------------------------------------------------------------------|------------|
| EMSE 4191 | Senior Project in Systems Engineering II | 3 |
| STAT 2183W | Intermediate Statistical Laboratory: Statistical Computing Packages | 3 |
| Three professional electives ⁶ | | 9 |
| Total Credits | | 129 |

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

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

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

⁴One 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.

⁵In 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.

⁶Professional 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.