

# ENGINEERING MANAGEMENT AND SYSTEMS ENGINEERING

## Mission Statement

The mission of the Department of Engineering Management and Systems Engineering is to deliver an integrated program of research, teaching, and public service to the technology community. The Department develops creative leadership to bridge dynamic, complex technologies and societal needs. This includes delivering instruction in the management of technology and in systems engineering, operations research, and allied fields to undergraduate and graduate students who are preparing to assume leadership roles as technology professionals.

The Department's education programs provide an understanding of the managerial role, analysis of the diverse functions of technology based organizations, and instruction in modern management and mathematical analysis and modeling tools, artificial intelligence, as they apply to formulating and executing decisions in engineering and scientific organizations. Research programs feature research in the management of technology; fundamental and applied research in systems engineering and operations research, with a particularly strong interest in stochastic analysis and system optimization; artificial intelligence; sponsorship from government, industry, and the technology community; and a strong presence in refereed professional journals and leadership in professional societies.

## Engineering Management and Systems Engineering Program Educational Objectives

The overarching educational objective of the engineering management and systems engineering undergraduate program is to enable students to interpret and incorporate the complexities of human society beyond the boundaries of their profession and to be able to make meaningful contributions as professionals and responsible citizens to the local community as well as national and global societies. Program graduates are expected to achieve one or more of the following program educational objectives within a few years of their graduation, particularly in the careers they have pursued in engineering management and/or systems engineering or closely related disciplines:

- Technical knowledge and critical thinking: Develop transformative models grounded on mathematics, engineering, and analysis to identify, formulate, and solve new and emerging problems in a variety of systems and systems of systems.
- Leadership skills: Manage a complex systems engineering project in a private or government agency, tackle real-world challenges and demonstrate proficiency in multiple forms of communication, including written reports, oral presentations, and executive-level summaries.
- Continuous education: Pursue and maintain currency in engineering knowledge and related disciplines through advanced graduate research, self-education, and exploration of new subject areas.

- Multidisciplinary thinking and professionalism: Complement systems engineering knowledge, problem-solving, and communication skills in other professions, such as law, medicine, business, education, or public policy.

## Engineering Management and Systems Engineering Program Student Outcomes

For consistency and tractability, engineering management and systems engineering student outcomes have directly used and adopted the definitions of the student outcomes as published by ABET.

- Ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- Ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
- Ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
- Ability to communicate effectively with a range of audiences.
- Ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
- Ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
- Ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
- Ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

## UNDERGRADUATE

### Bachelor's programs

- Bachelor of Science with a major in systems engineering (<https://bulletin.gwu.edu/engineering-applied-science/engineering-management-systems-engineering/bs-systems-engineering/>)\*

### Combined programs

- Dual SEAS Bachelor of Science majors and Master of Science in the field of engineering management (<https://bulletin.gwu.edu/engineering-applied-science/computer-science/combined-seas-bs-ms-engineering-management/>)
- Dual SEAS Bachelor of Science majors and Master of Science in the field of systems engineering (<https://bulletin.gwu.edu/>)

## Minors

- Minor in data analytics for decisions (<https://bulletin.gwu.edu/engineering-applied-science/engineering-management-systems-engineering/data-analytics-for-decisions-minor/>)
- Minor in engineering management (<https://bulletin.gwu.edu/engineering-applied-science/engineering-management-systems-engineering/minor-engineering-management/>)
- Minor in operations research (<https://bulletin.gwu.edu/engineering-applied-science/engineering-management-systems-engineering/minor-operations-research/>)
- Minor in systems engineering (<https://bulletin.gwu.edu/engineering-applied-science/engineering-management-systems-engineering/minor-systems-engineering/>)

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\*The bachelor of science with a major in systems engineering is accredited by the ABET Engineering Accreditation Commission (EAC).

## GRADUATE

### Master's programs

- Master of Engineering in the field of artificial intelligence and machine learning (<https://bulletin.gwu.edu/engineering-applied-science/engineering-management-systems-engineering/artificial-intelligence-and-machine-learning-meng/>) (online)\*
- Master of Engineering in the field of cloud computing management (<https://bulletin.gwu.edu/engineering-applied-science/cloud-computing-management-meng/>) (online)\*
- Master of Engineering in the field of cybersecurity analytics (<https://bulletin.gwu.edu/engineering-applied-science/cybersecurity-analytics-meng/>) (online)\*
- Master of Engineering in the field of cybersecurity policy and compliance (<https://bulletin.gwu.edu/engineering-applied-science/engineering-management-systems-engineering/cybersecurity-policy-and-compliance-meng/>) (online)\*
- Master of Science in the field of data analytics (<https://bulletin.gwu.edu/engineering-applied-science/engineering-management-systems-engineering/data-analytics-ms/>) (on-campus)\*\*
- Master of Science in the field of engineering management (<https://bulletin.gwu.edu/engineering-applied-science/engineering-management-systems-engineering/engineering-management-ms/>) (on-campus)
- Master of Science in the field of engineering management (<https://bulletin.gwu.edu/engineering-applied-science/engineering-management-ms-online/>) (online)
- Master of Science in the field of systems engineering (<https://bulletin.gwu.edu/engineering-applied-science/engineering->

management-systems-engineering/systems-engineering-ms/ (on-campus)

- Master of Science in the field of systems engineering (<https://bulletin.gwu.edu/engineering-applied-science/engineering-management-systems-engineering/systems-engineering-ms-online/>) (online)

\*Not offered on-campus.

\*\*Not offered online.

### Combined program

Joint Master of Science in the Field of Engineering Management and Juris Doctor (<https://bulletin.gwu.edu/engineering-applied-science/engineering-management-systems-engineering/joint-engineering-management-ms-jd/>)

## DOCTORAL

### Doctoral program

- Doctor of Engineering in the field of artificial intelligence and machine learning (<https://bulletin.gwu.edu/engineering-applied-science/artificial-intelligence-and-machine-learning-deng/>) (online)
- Doctor of Engineering in the field of engineering management (<https://bulletin.gwu.edu/engineering-applied-science/engineering-management-systems-engineering/doctor-engineering-management/>) (on-campus)
- Doctor of Engineering in the field of engineering management (<https://bulletin.gwu.edu/engineering-applied-science/engineering-management-systems-engineering/doctor-engineering-management-online/>) (online)
- Doctor of Engineering in the field of systems engineering (<https://bulletin.gwu.edu/engineering-applied-science/engineering-management-systems-engineering/doctor-systems-engineering/>) (on-campus)
- Doctor of Engineering in the field of systems engineering (<https://bulletin.gwu.edu/engineering-applied-science/engineering-management-systems-engineering/doctor-systems-engineering-online/>) (online)
- Doctor of Philosophy in the field of engineering management (<https://bulletin.gwu.edu/engineering-applied-science/engineering-management-systems-engineering/phd-engineering-management/>) (on-campus)
- Doctor of Philosophy in the field of engineering management (<https://bulletin.gwu.edu/engineering-applied-science/engineering-management-systems-engineering/doctor-philosophy-engineering-management-online/>) (online)
- Doctor of Philosophy in the field of engineering management (<https://bulletin.gwu.edu/engineering-applied-science/engineering-management-systems-engineering/doctor-philosophy-engineering-management/>) (online)
- Doctor of Philosophy in the field of systems engineering (<https://bulletin.gwu.edu/engineering-applied-science/engineering-management-systems-engineering/doctor-philosophy-systems-engineering/>) (online)

engineering-management-systems-engineering/phd-systems-engineering/) (on-campus)

- Doctor of Philosophy in the field of systems engineering (<https://bulletin.gwu.edu/engineering-applied-science/engineering-management-systems-engineering/phd-systems-engineering-online/>) (online)

## CERTIFICATES

### Graduate certificate programs

- Artificial Intelligence and Machine Learning (<https://bulletin.gwu.edu/engineering-applied-science/engineering-management-systems-engineering/artificial-intelligence-machine-learning-certificate/>)
- Business crisis, continuity, and recovery management (<https://bulletin.gwu.edu/engineering-applied-science/engineering-management-systems-engineering/business-crisis-continuity-recovery-management-certificate/>)
- Emergency management and homeland security (<https://bulletin.gwu.edu/engineering-applied-science/engineering-management-systems-engineering/energy-management-homeland-security-certificate/>)
- Cybersecurity (<https://bulletin.gwu.edu/engineering-applied-science/electrical-computer-engineering/certificate-cybersecurity/>)
- Emergency management and public health (<https://bulletin.gwu.edu/engineering-applied-science/engineering-management-systems-engineering/emergency-management-public-health-certificate/>)
- Energy engineering and management (<https://bulletin.gwu.edu/engineering-applied-science/engineering-management-systems-engineering/energy-engineering-management-certificate/>)
- Energy systems management (<https://bulletin.gwu.edu/engineering-applied-science/engineering-management-systems-engineering/energy-systems-management-certificate/>)
- Engineering and technology management (<https://bulletin.gwu.edu/engineering-applied-science/engineering-management-systems-engineering/engineering-technology-management/>)
- Environmental Systems Management (<https://bulletin.gwu.edu/engineering-applied-science/engineering-management-systems-engineering/environmental-systems-management-certificate/>)
- Systems engineering (<https://bulletin.gwu.edu/engineering-applied-science/engineering-management-systems-engineering/systems-engineering-certificate/>)
- Systems engineering (<https://bulletin.gwu.edu/engineering-applied-science/engineering-management-systems-engineering/systems-engineering-certificate-online/>) (online)
- Trustworthy AI for decision making systems (<https://bulletin.gwu.edu/engineering-applied-science/engineering-management-systems-engineering/trustworthy-ai-for-decision-making-systems-certificate/>)

## FACULTY

Professors: J.P. Deason, J.R. van Dorp, T.A. Mazzuchi, B. Narahari, S. Sarkani

Associate Professors: H. Abeledo, J.A. Barbera, J.R. Santos, R.A. Francis, Z. Szajnfarber (*Chair*)

Assistant Professors: D. Broniatowski, E. Gralla, J.P. Helveston, E. Shittu,

Professorial Lecturers: R.M. Andersen, M.J. Armstrong, J.H. Chang, T.H. Holzer Jr., J.V. Shah, J.S. Wasek, R.C. West

## COURSES

### Explanation of Course Numbers

- Courses in the 1000s are primarily introductory undergraduate courses
- Those in the 2000s to 4000s are upper-level undergraduate courses that can also be taken for graduate credit with permission and additional work assigned
- Those in the 6000s and 8000s are for master's, doctoral, and professional-level students
- The 6000s are open to advanced undergraduate students with approval of the instructor and the dean or advising office
- Applied Sciences (APSC) (<https://bulletin.gwu.edu/courses/apsc/>)
- Engineering Management and Systems Engineering (<https://bulletin.gwu.edu/courses/emse/>) EMSE (<https://bulletin.gwu.edu/courses/emse/>)