ENGINEERING EDUCATION
For the
NEXT GENERATION

Online Graduate Degree Programs in Engineering

onlineemse.seas.gwu.edu
At the George Washington University, we believe in the power of tomorrow’s engineering leaders to shape the world we live in for the better. Drawing on the close connections to D.C. institutions and the history of achievement and innovation that distinguishes GW as a pioneering educational institution, our online graduate programs in engineering are designed to help students gain the practice and skills they need to pursue exciting new career paths. We’re proud to offer our 100% online Master of Science in engineering management and Master of Science in systems engineering programs to working professionals and aspiring leaders around the world.

The programs are designed to support the Department of Engineering Management and System Engineering’s mission of preparing the next generation of leaders through constant adaptation to the changing engineering landscape. As one of the oldest and largest departments in engineering management and systems engineering in the country, we strive to provide a research-based, practical, rigorous education to our students. Because of this dedication to responsive, relevant teaching, the Department has gained and now holds its place among the premier engineering institutions in the world.

The programs share a core curriculum focused on the principles of organizational leadership as they apply specifically to technical businesses and institutions. This arms students with the creative facilities, practical skills, and confidence they need to address complex challenges for the betterment of today’s technology-driven society. As much as our programs benefit from a demanding technical curriculum, they also heavily emphasize the operations, management, and personnel facets crucial to effective leadership of an engineering or scientific organization.

As a result, graduates of our online programs can expand into new roles as efficient, driven managers, approaching the many interconnected elements that impact engineering projects from a wide-ranging perspective.
The online M.S. in engineering management provides a specialized alternative to traditional business coursework, focusing specifically on management and leadership in engineering organizations and companies. Students of the program develop a thorough understanding of technical management, which can be applied directly to technology companies, scientific institutions, manufacturers, and in other leading-edge technical environments.

While many engineering management programs put more emphasis on technical skills, this program’s curriculum is primarily designed to provide a thorough analysis of high-tech organizations and how to lead them most effectively. Required courses examine methods of balancing budgets, staff, and technical requirements to create cohesive, efficient projects. The program is relevant to those from a variety of backgrounds – whether you’re an experienced, trained engineer seeking a leadership role, or a business professional looking to gain industry-specific leadership skills.

Through the program, students enhance their understanding of many critical topics and functions, including:
- Organizational management and behavior
- Operations
- Project management
- Marketing of technology
- Cost and quality control
- Engineering contract management

Additionally, graduates of the online M.S. in engineering management will be prepared to take the Project Management Professional (PMP) exam offered by the Project Management Institute to further establish their credentials as a strong leader.

As a field that incorporates many disciplines, systems engineering demands a multifaceted skill set of managers and leaders at every stage of a project. The online M.S. program in systems engineering is designed to build on these skills, helping IT, analytics, and other technology professionals supervise technical development and implementation processes from start to finish while maintaining system performance well into the future.

The program strikes a balance between quantitative and personnel-driven subjects, providing an in-depth examination of organizational behavior and management as well as technical areas like stochastic models, systems architecture, and others – with all coursework based on the latest research. Because of this interdisciplinary focus, graduates of the program have gone on to confidently lead technical projects and pursue new roles in their careers.

Students gain a complete, multifaceted understanding of systems engineering through a curriculum that explores the following subjects, among many others:
- Project management
- Accounting and finance
- Risk management
- Systems analysis and evaluation
- Architecture and advanced modeling
- Axiomatic design
- Requirements management

As an additional benefit of the online master’s program in systems engineering, the required coursework includes the knowledge necessary to prepare you for the Certified Systems Engineering Professional (CSEP) exam offered by the International Council on Systems Engineering (INCOSE).
The online graduate programs in engineering at GW are designed to accommodate students who work full-time. Required coursework can be completed as it suits your schedule. Students who work will be able to put the skills they learn directly into practice at the workplace.

Core Courses

**EMSE 6001 The Management of Technical Organizations** (3 credits)
The practice of management as applied within technical organizations. Includes history of the tradition and current effective practices, research findings, and case studies, with objectives of enhanced understanding of external and internal factors influencing organizational performance and leadership requirements.

**EMSE 6020 Decision Making with Uncertainty** (3 credits)
Problem formulation. Concepts and techniques used in analyzing complex decision problems. Modeling decision problems using decision trees, probability models, multi-objective models and utility theory.

**EMSE 6099 Problems in Engineering Management and Systems Engineering** (3 credits)
Capstone project providing the opportunity to apply concepts and tools previously studied to the solution of a real-world problem. Students work in small groups, on a problem proposed by students and approved by the instructor. Open only to master's candidates in the department, preferably during the last semester of their program.

**EMSE 6110 Survey of Finance and Engineering Economics** (3 credits) *
Survey of material relevant to financial decision making for engineering activity. Includes traditional engineering economy topics; fundamentals of accounting; and financial planning, budgeting, and estimating applicable to the management of technical organizations.

Both the online master's in engineering management and the online master's in systems engineering require a minimum of 36 credit hours of graduate-level coursework. Both programs have the same core requirements, which comprise 24 credits, in addition to 12 credits of focus area specialization. Even for students working full-time, the program is typically completed in roughly 3 years.

**M.S. in Engineering Management Required Courses**

**EMSE 6005 Organizational Behavior for the Engineering Manager** (3 credits)
The behavior of individuals and groups in the context of technical organizations, focusing on relationships and interactions within the organization's operating activities. Individual and group development and motivation. Organizational structures and cultures.

**EMSE 6014 Management of Engineering Contracts** (3 credits)
Study of the total contracting process (including initial budget preparation and justification, execution of a contract, and administration of the contract to completion) considered from the viewpoints of the industrial and government buyer and the seller of technical materials and services.

**EMSE 6035 Marketing of Technology** (3 credits)
Analysis of industrial marketing process and functions, providing concepts and tools for engineering managers to market high technology products and services.

**EMSE 6020 Decision Making with Uncertainty** (3 credits)
Problem formulation. Concepts and techniques used in analyzing complex decision problems. Modeling decision problems using decision trees, probability models, multi-objective models and utility theory.

**EMSE 6025 Project Cost and Quality Management** (3 credits)
Developing project cost and resource estimates during the planning stages. Monitoring, forecasting, and controlling cost throughout the project life cycle. Project quality planning, assurance, and control. Relationships among project scope, time, cost, quality, human resources, communications, procurement, and risk. Preparation for the Project Management Professional examination.

**M.S. in Systems Engineering Required Courses**

**EMSE 6805 Systems Engineering II** (3 credits)
Application of systems engineering tools to provide hands-on experience with essential elements of practice. Processes of requirements engineering, functional analysis and allocation, risk management, architecting; architectural heuristics, axiomatic design, analytical assessment of alternative architectures. Prerequisite: EMSE 6801.

**EMSE 6810 Systems Analysis and Management** (3 credits)
The systems or holistic approach as a methodology for making decisions and allocating resources. Analysis by means of objectives, alternatives, models, criteria, and feedback.

**EMSE 6815 Requirements Engineering** (3 credits)
Requirements in systems engineering, including requirement types, quality factors, elicitation methods, analysis, derivation of implicit requirements, management, traceability, verification, cross-requirement assessments, and validation. Focus on writing and managing quality requirements in complex systems.

**EMSE 6840 Applied Enterprise Systems Engineering** (3 credits)
Applications of systems engineering in the DoD, other parts of the federal government, and commercial sectors. Architectural frameworks and enterprise architecting concepts and practices, including JCIDS/ DODAF, Federal Enterprise Architecture Framework, and Zachman™ Framework. Enterprise architecting and advanced modeling tools.

*Students have the option of taking this course during the summer start in a 5-week accelerated format.
Admissions

Ideal candidates for the programs will meet the following requirements:

- Minimum grade point average of B (3.0 on a 4.0 scale) or higher.

- Grade of B- or better in two college calculus courses – this is a prerequisite to all graduate programs in the EMSE Department. Applicants who do not meet this requirement must take the 3-credit hour course, EMSE 4197 Special Topics: Quantitative Methods in Engineering Management, during the first year of graduate study.

- Received a bachelor’s degree in engineering, a physical science, mathematics, computer science, business administration, or information technology from a regionally accredited institution.

Note: GW considers a candidate’s entire background and all submitted materials when reaching an admission decision. Applicants who do not meet these requirements may still be eligible for admission and their records will be evaluated on a case-by-case basis. Please contact an Admissions Counselor for more information.

Admissions Materials

To apply, please submit the following materials:

- **Completed Application**

- **Official Transcripts:** Transcripts are required from all institutions whether or not a degree was earned. Official transcripts are required to complete a student file. More information on transcript requirements can be found on our website’s transcript policy page. Official transcripts can be sent directly from the institution to our office via email at applyoffcampus@gwu.edu or in a sealed envelope via mail at:

  EMSE Online Programs  
  Attn: Michelle Harris  
  1 Old Oyster Point Rd, Ste 220  
  Newport News, VA 23602

- **Statement of Purpose:** In an essay of 250 words or less, 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.

- **Letters of Recommendation:** Three letters of recommendation are required for admission and at least one letter must come from a professional reference. Please download the letter of recommendation form, fill out the top portion, and email the form to the individual providing the recommendation. A letter of recommendation is considered official only when it is sent directly from the individual providing the recommendation to an Admissions Counselor via email at onlineemse@gwu.edu or via fax at 888-245-5409. Submissions sent directly from applicants are not accepted.

- **Current Resume or CV.** This can be submitted to onlineemse@gwu.edu.

- **GRE and GMAT scores are not required** to complete the application packet, but can be submitted to strengthen the application.

- **International Applications:** If academic records are in a language other than English, a copy in the original language and an English language translation must be submitted. Transcript evaluations need not be sent.

  **Note:** There is no application fee for this program.
At GW, providing world-class programs at an affordable tuition rate is one of our fundamental goals. Our online graduate degree programs in engineering require no additional fees, and required textbooks and software are included in the price of tuition, which is among the most competitively priced in the nation. This allows students to pursue a top-tier education and expand their career possibilities online, on their own schedule, confident that they are making a smart investment in their future.

Tuition per course: $2,580
Total tuition (minimum 36 credits): $30,960
Registration fee (per semester): $35

Contact Information
Phone: (877) 221-9868
Fax: 202-994-0906
Email: finaid@gwu.edu
Prospective students can also contact an Admissions Counselor at (877) 221-9868 for more information about financial aid.

Financial Aid
As a GW student you have several types of financial assistance programs available to you. The Office of Student Financial Assistance administers financial aid to graduate students. They will assist in the administration/certification of education loans to help meet the program's tuition cost.
The George Washington University was chartered in 1821 by an act of Congress, the result of an initiative that began as the idea of our namesake, George Washington. President Washington envisioned a university in the nation’s capital that would prepare citizen leaders brought together from all over the world. Today, we are that university, with students and faculty members from every state and more than 130 countries. Taking full advantage of our setting in a global nerve center, a GW education integrates intellectual discovery, interactive learning, and unparalleled access to opportunities in every sector of society. In a city shaping the future, George Washington is a university where faculty and students not only study the world but also work to change it for the better.

The Department of Engineering Management and Systems Engineering is one of the oldest and largest departments of its kind in the nation, with over 1,200 students at varying levels of study. 20% of these students are completing their courses of study entirely online – a testament to the accessibility and practicality of our online learning platform.

We strive to offer online students direct access to the world-class faculty, pioneering research, and spirit of exploration that defines GW as a leading institution. Beyond that, we’re committed to supporting online students as they pursue their education and welcoming them to the GW academic community.

Contact an Admissions Counselor today to start your path toward engineering leadership:

Email: onlineemse@gwu.edu
Phone: (877) 221-9868