Master of Science Degree and Certificate Programs in Systems Engineering and Management (MS-SEM)

The Systems Engineering and Management MS-SEM is a 36 semester credit hours STEM (Science, Technology, Engineering and Mathematics) degree program jointly offered by the Naveen Jindal School of Management (JSOM) and the Erik Jonsson School of Engineering and Computer Science (ECS). It is a unique program that offers a flexible choice of core courses in both engineering and management disciplines, with elective courses for concentrations in various industry sectors.

JSOM Faculty

**Professors:** Alain Bensoussan, Gregory G. Dess, Mike W. Peng

**Clinical Professors:** Abhijit Biswas, Peter Lewin, Rajiv Shah

**Associate Professors:** Surya N. Janakiraman, Robert L. Kieschnick Jr., David J. Springate

**Clinical Associate Professor:** Shawn Alborz, Carolyn Reichert, Avanti P. Sethi, James Szot

**Clinical Assistant Professors:** Jeffery (Jeff) Hicks, Ravi Narayan

ECS Faculty

**Professors:** S.O. Reza Moheimani, Mark W. Spong, Lakshman Tamil, Mathukumalli Vidyasagar, W. Eric Wong, Steve Yurkovich

**Associate Professor:** Lawrence Chung

**Assistant Professor:** Robert D. Gregg, Justin Ruths

**Senior Lecturers:** Nhut Nguyen, Janell Straach

Admission Requirements

A student lacking undergraduate prerequisites for graduate courses must complete prerequisites or receive approval from the graduate advisor and the course instructor. A diagnostic examination may be required. Please consult with the University's general admission requirements, discussed in the graduate catalog, whereas specific admission requirements for the MS-SEM follow.
A student entering the MS-SEM program (Traditional Master's) should meet the following guidelines:

- A minimum of a BS in engineering, mathematics, physics, chemistry, economics or finance from an accredited program (specifically, programs that provide adequate fundamental skills in mathematics).
- Must submit GRE and/or GMAT scores as appropriate.
- Must submit three letters of recommendation from individuals who are able to judge the candidate's probability of success in pursuing a program of study leading to the MS-SEM degree.
- Must also submit an essay outlining the candidate's background, education, and professional goals.

**Degree Requirements**

The MS-SEM program is designed to be flexible to accommodate different student backgrounds, allowing students to **pick up areas in which they are deficient**, while still guaranteeing core competency in systems engineering and systems management. This program has both a thesis and a non-thesis option. All part-time MS-SEM students will be assigned initially to the non-thesis option. Those wishing to elect the thesis option may do so by obtaining the approval of a faculty thesis supervisor. Part-time students are encouraged to enroll in only one course during their first semester and in no more than two courses during any semester that they are also working full-time.

The MS-SEM degree requires a total of 36 semester credit hours consisting of 12 courses in the non-thesis option or 10 courses plus six semester credit hours of thesis credit for the thesis option. All students must have an academic advisor and an approved degree plan. Courses taken without advisor approval will not count toward the 36 semester credit hour requirement. Successful completion of the approved course of studies leads to the MS-SEM degree. Please note that the University's general degree requirements are discussed elsewhere in the graduate catalog.

This degree requires the completion of a minimum of 36 semester credit hours of graduate level lecture courses. For the four core courses, students must have a GPA of at least 3.0 and receive a grade of B- or better in each. Students must maintain a 3.0 GPA overall to graduate with the MS-SEM degree. With advisor approval, one 5000 level courses may be used in the concentration (see Course Requirements).

An alternative to 36 semester credit hours required for the MS-SEM degree would be the completion of a minimum of 30 semester credit hours of graduate level lecture courses, with a grade of B- or better in each of the required core courses (see Course Requirements), six semester credit hours of a combination of master's research (**SYSM 6V70**) and thesis (**SYSM 6V90**), submitted to the graduate school, and a formal public defense of the thesis.

Students enrolled in the thesis option should meet with individual faculty members to discuss research opportunities and to choose a research advisor during the first or second semester that the student is enrolled. After the second semester of study, course selection should be made in consultation with the research advisor.

Research and thesis semester credit hours cannot be counted in an MS-SEM degree plan unless a thesis is written and successfully defended. A supervising committee, which must be chosen in consultation with the student's thesis advisor prior to enrolling for thesis credit, administers the
defense. With advisor approval, the lecture courses may include some 5000 level courses. Full-time students at UT Dallas who receive financial assistance are required to enroll in nine semester credit hours each semester.

Course Requirements

Core Courses: 12 semester credit hours

Students are required to take four courses (a total of 12 semester credit hours) from the eight courses listed below. Two of the courses must be from the Engineering Core section and two from the Management Core section. The four required courses contribute a total of 12 semester credit hours toward the MS degree.

**Engineering Core Courses**

Choose two courses from the following:

- **SYSM 6301** Systems Engineering, Architecture and Design
- **SYSM 6302** Dynamics of Complex Networks and Systems
- **SYSM 6303** Statistics and Data Analysis
- **SYSM 6305** Optimization Theory and Practice

**Management Core Courses**

Choose two courses from the following:

- **SYSM 6311** Systems Project Management in Engineering and Operations
- **SYSM 6318** Marketing Management
- **SYSM 6333** Systems Organizational Behavior
- **SYSM 6337** Accounting for Managers

Prescribed Electives: 12 semester credit hours

Students are required to take an additional four courses (a total of 12 semester credit hours) from the set of eight core courses listed above and/or the set of courses listed below. Two of these courses must be chosen from the two Engineering sections (core and elective), and two from the two Management sections (core and elective). Because a program objective is to maintain a high degree of flexibility, students are encouraged to work with an MS-SEM program advisor to discuss possible (limited) exceptions and substitutions for the prescribed elective courses.

**Engineering Elective Courses**

- **SYSM 6304** Risk and Decision Analysis
- **SYSM 6306** Engineering Systems: Modeling and Simulation
** Linear Systems  
** Software Maintenance, Evolution, and Re-Engineering  
** Advanced Requirements Engineering  
** Software Testing, Validation and Verification  
** Requirements Design, Development, and Integration for Complex Systems  
** Systems Life Cycle Cost Analysis  
** Systems Reliability  
** Computer and Network Systems Security  

**Management Elective Courses**  
** Systems Financial Management  
** Systems Negotiation Deals and Dispute Resolution  
** The Entrepreneurial Experience  
** Managing Innovation within the Corporation  
** Business Economics  
** Strategic Leadership  
** Technology and New Product Development  
** Systems Operations Management  
** Organizing for Business Analytics: A Systems Approach  
** Earned Value Management Systems  

**Free Electives: 12 semester credit hours**

Working with an MS-SEM program advisor, students are required to take four additional and distinct courses either from the remaining SYSM courses listed above or from other courses offered in management or engineering that form a "concentration" or "specialization" in systems-related, possibly industry-specific sectors.

The concentration area consists of four courses (12 semester credit hours) in the degree program; examples include: Aerospace and Defense Systems; Business and Data Analytics; Control and Mechatronic Systems, Cybersecurity and Information Assurance, Energy and Infrastructure Systems, Enterprise and Data Management Systems; Entrepreneurship and Innovation Management; Global Supply Chain Management; Healthcare Systems; Optimization and Operations Research; Telecom, IT and Multimedia Networks, and Transportation Systems.

Finally, because of the flexible nature of the MS-SEM degree program, students may request a "personalized" concentration area that focuses on aspects of systems engineering, and may combine elements of other concentration areas on a focused theme.
Double MS-SEM/MBA Degree

63-65 semester credit hours

Overview

The Naveen Jindal School of Management (JSOM) and the Erik Jonsson School of Engineering and Computer Science (ECS) offer a joint MS-SEM and MBA degree program. This is a 63-65 semester credit hours degree program (excluding pre-requisites) that provides students with opportunities to learn from excellent faculty and places them at the forefront in the fields of systems engineering management and business leadership. This program allows students to earn a combination of a master’s level specialist degree in systems engineering and management and a MBA together. Both degrees separately would require significantly more semester credit hours, but in the joint program students can earn both degrees with a smaller total of semester credit hours. Pursuing these degrees together offers students a special opportunity to earn a distinctive set of credentials from UT Dallas.

Faculty

Faculty and lecturers for the courses in this program are drawn from the Erik Jonsson School of Engineering and Computer Science, and from the Naveen Jindal School of Management (see individual faculty listings in the MS-SEM program and the MBA programs).

Double-Degree Admission Requirements

Students pursuing the double MS-SEM and MBA degree program must meet the admission requirements for both programs and submit all required documents for admission to both programs. Students joining the Traditional Master's MS-SEM degree program must first complete their 36 semester credit hours of the MS-SEM program. Students have up to six years to accumulate remaining required core hours for the MBA Degree (details with respect to program-specific requirements can be obtained from the advisors for the two programs).

Certificate Programs

The MS-SEM program offers two certificates: a Certificate in Systems Engineering and a Certificate in Systems Management, primarily intended for students who do not wish to pursue the complete MS degree. Each certificate requires 12 semester credit hours. See Course Descriptions for information on course content. These certificates allow students to fit their education into their busy schedules and pursue the track that best fits their career path. These flexible education programs provide students with outstanding opportunities to access UT Dallas world-class faculty and hands-on learning experiences.

Faculty

Please see the MS-SEM listing for faculty and lecturers in this program.
Certificate in Systems Engineering

12 semester credit hours

Students are required to complete **SYSM 6301** and **SYSM 6311** and any two courses from the set of engineering courses listed below.

- **SYSM 6301** Systems Engineering, Architecture and Design
- **SYSM 6311** Systems Project Management in Engineering and Operations

**Systems Engineering Courses**

- **SYSM 6302** Dynamics of Complex Networks and Systems
- **SYSM 6303** Statistics and Data Analysis
- **SYSM 6304** Risk and Decision Analysis
- **SYSM 6305** Optimization Theory and Practice
- **SYSM 6306** Engineering Systems: Modeling and Simulation
- **SYSM 6307** Linear Systems
- **SYSM 6308** Software Maintenance, Evolution, and Re-Engineering
- **SYSM 6309** Advanced Requirements Engineering
- **SYSM 6310** Software Testing, Validation and Verification
- **SYSM 6325** Requirements Design, Development, and Integration for Complex Systems
- **SYSM 6326** Systems Life Cycle Cost Analysis
- **SYSM 6327** Systems Reliability
- **SYSM 6328** Computer and Network Systems Security

Certificate in Systems Management

12 semester credit hours

Students are required to complete **SYSM 6301** and **SYSM 6311** and any two courses from the set of management courses listed below.

- **SYSM 6301** Systems Engineering, Architecture and Design
- **SYSM 6311** Systems Project Management in Engineering and Operations

**Systems Management Courses**

- **SYSM 6312** Systems Financial Management
- **SYSM 6313** Systems Negotiation and Dispute Resolution
SYSM 6315 The Entrepreneurial Experience
SYSM 6316 Managing Innovation within the Corporation
SYSM 6318 Marketing Management
SYSM 6319 Business Economics
SYSM 6320 Strategic Leadership
SYSM 6332 Technology and New Product Development
SYSM 6333 Systems Organizational Behavior
SYSM 6334 Systems Operations Management
SYSM 6335 Organizing for Business Analytics: A Systems Approach
SYSM 6336 Earned Value Management Systems
SYSM 6337 Accounting for Managers