Naveen Jindal School of Management

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

36 semester credit hours minimum

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.

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 also note that the university's general degree requirements are discussed elsewhere in the graduate catalog.

Non-thesis Option

Completion of a minimum of 36 semester credit hours of graduate level lecture courses including the required core courses. With advisor approval, these may include some 5000 level courses. Students must earn a grade of "B" or better in each of four core courses (see below).

Thesis Option

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 below), 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. 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 they are also working full-time.

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
course requirements

Core Courses: 12 semester credit hours

Students are required to take four courses (a total of 12 semester credit hours) from a set of eight courses in the lists 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**

- **SYSM 6301** Systems Engineering, Architecture and Design
- **SYSM 6302** Dynamics of Complex Networks and Systems
- **SYSM 6303** Quantitative Introduction to Risk and Uncertainty in Business
- **SYSM 6305** Optimization Theory and Practice

**Management Core Courses**

- **SYSM 6311** Systems Project Management in Engineering and Operations
- **SYSM 6312** Systems Financial Management
- **SYSM 6318** Marketing Management
- **SYSM 6333** Systems Organizational Behavior

Prescribed Elective Courses: 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
- **SYSM 6307** Linear Systems
- **SYSM 6308** Software Maintenance, Evolution, and Re-Engineering
Advanced Requirements Engineering
Software Testing, Validation and Verification
Financial Engineering I
Financial Engineering II

Management Elective Courses
Systems Negotiation and Dispute Resolution
Manufacturing and Service Systems Planning and Analysis
The Entrepreneurial Experience
Managing Innovation Within the Corporation
The Management of High Tech Products
Business Economics
Strategic Leadership
Technology and New Product Development

Free Elective Courses: 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: 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 and Biomedical 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 submit for approval a "personalized" concentration area that focuses on aspects of systems engineering, and may combine elements of other concentration areas on a focused theme.

SEM Graduate Certificates

Each certificate requires 12 semester credit hours. The courses are offered in an Executive Education (4 semester credit hour module format).

Graduate Certificate in Systems Engineering

12 semester credit hours
The graduate certificate in systems engineering requires students to complete over the period of one academic year two courses from the set of engineering courses listed below, and any two additional courses from the remainder of the 20 SYSM prefix courses listed below in either group, engineering or management.

**Systems Engineering Courses**

- **SYSM 6301** Systems Engineering, Architecture and Design
- **SYSM 6302** Dynamics of Complex Networks and Systems
- **SYSM 6303** Quantitative Introduction to Risk and Uncertainty in Business
- **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 6321** Financial Engineering I
- **SYSM 7321** Financial Engineering II

**Graduate Certificate in Systems Management**

12 semester credit hours

The graduate certificate in systems management requires students to complete over the period of one academic year two courses from the set of management courses listed below, and any two additional courses from the remainder of the 20 SYSM-prefix courses listed in either group, engineering or management.

**Systems Management Courses**

- **SYSM 6311** Systems Project Management in Engineering and Operations
- **SYSM 6312** Systems Financial Management
- **SYSM 6313** Systems Negotiation and Dispute Resolution
- **SYSM 6314** Manufacturing and Service Systems Planning and Analysis
- **SYSM 6315** The Entrepreneurial Experience
- **SYSM 6316** Managing Innovation Within the Corporation
Graduate Certificate in Cybersecurity Systems: 12 semester credit hours

The graduate certificate in Cybersecurity Systems Certificate (CCSS) is offered by the Erik Jonsson School of Engineering and Computer Science and Jindal School of Management. The CCSS may be combined with other courses and/or certificates toward an MS degree, such as Computer Science, Information Technology and Management, or Systems Engineering and Management, provided that the student has gained admission into that particular program.

To earn the certificate, students in the program must take four courses with an overall GPA of 3.0.

Required Course (3 semester credit hours)

MIS 6311 Cybersecurity Fundamentals

Track #1: Computer Science (CS) Emphasis (9 semester credit hours)

Students can choose three courses from the following:

CS 6324 Information Security
CS 6349 Network Security
CS 6348 Data and Applications Security

Or a course from a list of existing cybersecurity systems in Computer Science courses (offered periodically, and must be approved)

Track #2: Internal Audit, Information Management (IA/IM) Emphasis (9 semester credit hours)

Students must take MIS 6330 and ACCT 6336, and choose between ACCT 6380 or MIS 6363:

MIS 6330 Information Technology Security
ACCT 6336 Information Technology Audit and Risk Management
ACCT 6380 Internal Audit or MIS 6363 Cloud Computing
Track #3: Systems Engineering and Management Emphasis (9 semester credit hours)

Students must take **SYSM 6301**, and choose between **CS 6324** or **MIS 6330**:

- **SYSM 6301** Systems Engineering, Architecture and Design
- **CS 6324** Information Security or **MIS 6330** Information Technology Security

Students can choose at least one course from each of the CS and IA/IM tracks from the following:

- **CS 6348** Data and Applications Security (CS track)
- **CS 6349** Network Security (CS track)
- **MIS 6363** Cloud Computing (CS track)
- **ACCT 6336** Information Technology Audit and Risk Management (IA/IM track)
- **ACCT 6380** Internal Audit (IA/IM track)

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