

Master of Science in Systems Engineering

Comparison of Current and Revised Programs

CURRENT REQUIREMENTS (36 units, 12 courses):	REVISED REQUIREMENTS (30 credits, 10 courses):
<p>Group 1: Core courses, must take 3 courses from among the following</p> <ul style="list-style-type: none"> EL 525 Applied Matrix Theory EL 611 Signals, Systems and Transforms EL 621 Feedback Control I EL 625 Linear Systems EL 630 Probability MA 683 Statistical Inference I <p style="text-align: right;">9 Units</p>	<p>Required Core Course: choose 3 courses out of the following</p> <ul style="list-style-type: none"> EL 5213 Introduction to Systems Engineering EL 6213 System Modeling, Analysis and Design EL 6233 Systems Optimization Methods EL 6253 Linear Systems EL 6303 Probability MG8203 Project Management <p style="text-align: right;">9 credits</p>
<p>Group 2: Two approved one-year sequences, which may include the above core courses. At least one of these sequences must be in EL courses.</p> <p style="text-align: right;">6-12 Units</p>	<p>Sequence Tracks: Two approved tracks. One must be a core track. Must take ≥ 3 courses in each track, which may include the above core courses.</p> <p style="text-align: right;">12-18 credits</p>
<p>Group 3: Approved electives</p> <p style="text-align: right;">15-21 Units</p>	<p>Core Tracks:</p> <ul style="list-style-type: none"> ● Network Management ● Mobile Communications ● Systems and Automation ● Energy Systems ● Large Scale Systems Modeling and Control ● Multimedia Applications <p>Elective Tracks:</p> <ul style="list-style-type: none"> ● Computer Systems and Security ● Software Engineering ● Operations Research and Management ● Financial Engineering ● Biological Systems
<p>Thesis option: A 9-unit thesis may be included as part of the elective courses.</p>	<p>Free electives 3-9 credits</p> <p style="text-align: center;">Any science, engineering or management courses.</p>
<p>EL course requirement: At least 24 of the 36 minimum units must be in courses in engineering subjects, computer science or operations research, and at least 18 units must be in EL prefixed courses.</p>	<p>Thesis option: A 6-credit thesis may be selected and used to replace one course in each of the two sequence tracks.</p>
<p>EL course requirement: At least 15 credits must be from EL prefixed courses</p>	<p>EL course requirement: At least 15 credits must be from EL prefixed courses</p>
<p>GPA requirement: ≥ 3.0 among all courses</p>	<p>GPA requirement: ≥ 3.0 among all courses</p>

Master of Science in Systems Engineering

Revised 30 Credit Program Description, Effective Fall 2007

Systems engineering is based on the body of theoretical knowledge that underlies the engineering of modern complex systems. Systems engineering applies this body of knowledge to designing systems, usually involving the integration of several disciplines to achieve the desired design objective. The theoretical resources of these fields include selections from among the newer branches of applied mathematics, methods of modeling and simulation, methods for the analysis of signals and systems, the theories of communication and control, the techniques of optimization and of decision making and many of the facets of computer science.

Faced with a diverse and complex scientific environment, systems engineers may receive assignments crossing traditional lines of engineering applications. Systems engineering is presently applied in such areas as communications, networking, transportation, urban services, bioengineering, resource management, power and energy and environmental and pollution control.

The Systems Engineering Program covers, in an interdisciplinary manner, the viewpoints, analysis tools, and mathematical techniques of signals and systems, feedback control, statistics, stochastic processes, optimization, simulation, communication of information, instrumentation, and measurement. The orientation and training that systems engineering students receive at Polytechnic enable them to analyze and solve today's complex technological and societal problems.

The Department of Electrical and Computer Engineering administers the program leading to the degree Master of Science in Systems Engineering. Outstanding students should apply for financial aid in the form of research fellowships, teaching fellowships, or partial tuition remission. Students wishing to continue graduate study towards a PhD in the area of systems may do so in the Electrical Engineering Program.

GOALS AND OBJECTIVES

The Master of Science program in Systems Engineering has the following specific objectives to provide students with the following:

- Skills and advanced knowledge in the design and analysis of engineering systems, including methods of modeling and simulation, methods for the analysis of signals and systems, theories of communication and control and techniques of optimization and of decision-making
- Training in the use of modern computational tools to perform analysis and simulation and to solve real system problems
- Baseline skills and knowledge in systems engineering project management
- A basis for continued, lifelong learning in the systems engineering profession

REQUIREMENTS FOR THE MASTER OF SCIENCE

The entrance requirement for a Master of Science in Systems Engineering is a Bachelor's degree in engineering or science from an accredited institution, with at least a B average in undergraduate technical courses. It is noted that for some tracks, students should have taken undergraduate courses in differential equations, probability, linear systems, feedback control and computer programming. Deficiencies in any of the subject matters should be addressed by taking the required courses for any particular track.

To satisfy the requirements for an MS in Systems Engineering, students must complete three core courses and two tracks at least one of which must be a core track. A minimum of three courses should be taken in a track. One course in each track may be a core course. The remaining credits (up to 9 credits) can be chosen from any science, engineering and management courses. If a student elects to write a MS thesis (6 credits), then only two courses in a track are required. The total number of credits required is 30 and at least 15 credits should be from EL prefixed courses. A GPA of 3.0 or above is required in all graduate courses.

Core Courses:

Three courses chosen from among the following:

EL 5213	Introduction to Systems Engineering
EL 6213	System Modeling, Analysis and Design
EL 6233	Systems Optimization Methods
EL 6253	Linear Systems
EL 6303	Probability
MG8203	Project Management

9 Credits

Core Tracks:

- Network Management (EL5363, 5373, 6373, 7353, 7363)
- Mobile Communications (EL5013, 6013, 6023, 6033, 9303)
- Systems and Automation (EL5223, 5253, 6253, 8223)
- Energy Systems (EL5613, 6623, 6633, 6653)
- Large Scale Systems Modeling and Control (EL6253, 7253, 8253, 92x3)
- Multimedia Applications (EL5123, 5143, 6113, 6123, CS6643)

6-18 Credits

Elective Tracks:

- Computer Systems and Security (CS6813, 6823, 9043, EL6393)
- Software Engineering (CS6063, 6073, 6083, 6183)
- Operations Research and Management (MG6303, 6461, 8203, FE6023)
- Financial Engineering (FE6023, 6083, 6103, 6411, 6291)
- Biological Systems (Selected courses with prefix BE, CH, CM, subject to advisor approval)

0-9 Credits

Free Electives

Any courses in science, engineering or management

0-9 credits

Total: 30 Credits

The list of tracks and approved courses in a track may be updated after the publication of this catalog. Students should consult the Department of Electrical and Computer Engineering's Graduate Student Manual (www.poly.edu/ece/graduate) for the updated list. The Graduate Manual also contains more detailed rules and procedures including student status, transfer credits, recommended electives, current areas of research, and disqualification for low grades.