

SYSTEMS ENGINEERING

PROGRAM REQUIREMENTS (EFFECTIVE FALL 2012)

M.S.E. in Systems Engineering Requirements (for students starting Fall 2012 and later)

Students must complete 10 course units, following the requirements below. If a Master's thesis is done, it will count for 2 course units (2 C.U. of ESE 597).

The four-part requirements are as follows:

- A. Four (4) Required Courses**
- B. Two (2) Area Electives from the Approved List of Courses**
- C. One (1) Technical Elective**
- D. Three (3) Other Electives**

A. Four (4) Required Courses*:

ENM 503 Probability
ESE 504 Introduction to Optimization Theory
ESE 540 Engineering Economics
ESE 603 Simulation Modeling and Analysis

B. Two (2) Area Electives from the Approved List of Courses*:

ESE 500 Linear Systems Theory
ESE 502 Introduction to Spatial Analysis
ESE 505 Control of Systems
ESE 508 Information Systems for E-Commerce
ESE 544 Project Management
ESE 552 Transportation and Systems Engineering
ESE 554 Urban Transit Systems and Technology
ESE 555 Cities and Transportation Systems
ESE 567 Risk Analysis and Environmental Management
ESE 590 Systems Methodology
ESE 601 Hybrid Systems
ESE 605 Modern Convex Optimization
ESE 608 Intelligent and Animated Software Agents
ESE 617 Non-Linear Control Theory
ESE 632 Random Process Models and Optimum Filtering
ESE 650 Learning in Robotics
ESE 680 Special Topics
ESE 599 Independent Study
ESE 597 Thesis Research (up to 2 course units for thesis option)
TCOM 500 Introduction to Networks and Protocols

C. One (1) Technical Elective:

One course unit from the graduate offerings within ESE, CIS, MEAM, TCOM, CIT, EAS**, or ENM.

D. Three (3) Other Electives:

Three course units from the graduate courses offered in SEAS, SAS***, or Wharton.

NOTES:

- * Courses cross-listed with ESE courses to be applied under Part A or B must be taken as the ESE section number.
- ** Only the following EAS courses are allowed: EAS 504, 510, 545, 546 and 595.
- *** SAS course(s) need advisor and graduate group chair approval. They should have technical/scientific content and relevance to the student's program.

1. **Thesis Option-** Students who would like to complete a thesis may take two (2) units of Thesis Research (ESE 597)
2. A maximum of two CIT courses are allowed for the MSE in SE degree
3. A maximum of one course unit of Independent Study (ESE 599) is allowed
4. A maximum of two graduate-level course units may be transferred from another school to apply toward the MSE degree. These two courses should not have been used in fulfillment of an undergraduate degree.
5. Lockheed-Martin Transfer credit: Lockheed Martin students must petition for transfer credit in person, and bring a letter from the Company (your supervisor), clearly stating which Advanced Courses you completed and the final grade(s) awarded. All documents should be given to Betty Gentner, located in 111 Towne Building.
6. Full time Master's degree students normally register for three courses per semester. Full-time status requires at least three courses per semester.
7. Students are required to maintain a 2.7 GPA to remain in good academic standing. A minimum GPA of 2.7 is required for graduation.
8. Disallowed courses for any graduate degree in SEAS: A reminder that no undergraduate level courses, including those in SEAS, may be taken for a graduate degree requirement. There are courses that appear at the graduate level that are being offered by other parts of the University that will **not** be approved for SEAS graduate degree requirements. These include courses being offered in specialized and professional training programs, such as the Organizational Dynamics Program, the Wharton Certificate Programs for Working Professionals, and the Wharton Evening School.
9. For further regulations, see the **ESE Graduate Student Handbook:** <http://www.ese.upenn.edu/grad/mse.html>