Masters of Science in Systems Engineering (MSSE) prepare engineers to use system processes and frameworks to define, develop, implement, and test complex systems for the 21st century. Graduates are able to meet the challenges of understanding and applying new engineering models in constantly changing environments.

Complexity in today’s engineering projects is driving increasing demand for Systems Engineers with interdisciplinary training. Technology-driven revolutions can only be comprehended with the systems thinking perspective that a systems engineering education provides. Complex systems require integration for coherent effectiveness. Learn how to assure required capabilities and functional performance in demanding environments.

The M.S.S.E. program partly consists of four (4) core courses, three (3) courses in a concentration area, free elective(s), and a choice of Thesis or Project Practicum.

Core courses:
Each student is expected to have core knowledge in key areas of Systems Engineering. All students are required to complete the following four core courses:

- SE5341  Systems Engineering Fundamentals & Architectures (3-0)
- SE5342  Program and Systems Engineering Management (3-0)
- SE5343  Requirements Engineering (3-0)
- SE5344  Integration, Validation & Testing of Complex Systems (3-0)

Specialization Tracks / Prescribed Electives:
Major concentration areas include: Systems Engineering, Electrical Engineering, Industrial and Manufacturing Engineering, and Computer Science, or others approved by the College of Engineering (COE).

- Systems Engineering
- Electrical & Computer Engineering
- Industrial Engineering
- Manufacturing Engineering
- Computer Science

The MSSE program is designed for working professionals and students of all ages with an interest in understanding and applying the systemic approach to the development of complex systems. Course work stresses the importance of projects and the case studies of successful system implementations.

A Graduate Certificate in Systems Engineering (GCSE) is available with the completion of the 4 core courses and the Project Practicum.

Thesis option:
Writing a Thesis demonstrates independent thinking about systems, and is a strong indication to employers about supportable, independent thought by a graduate.

All students are expected to gain awareness of current research areas, and after discussion with program faculty, to propose viable topics for a Thesis.
The Thesis option in the Master of Science in System Engineering program consists of 24 credit hours of coursework, six (6) credit hours of Thesis I & II.

Project Practicum option:
The non-thesis Master of Science in System Engineering consists of 27 credit hours of coursework plus a three (3) credit hour Project Practicum with industry.

   The Project Practicum based MSSE is a 30 Semester Credit Hour (SCH) non-thesis program. Course work includes:
       1. 12 SCH in the Systems Engineering core courses
       2. 9 SCH Prescribed Electives in a concentration
       3. 6 SCH Free electives
       4. 3 SCH Project Practicum

Course Descriptions

**SE5341: Systems Engineering Fundamentals (3-0)**
Introduction to the key concepts, processes and process activities carried out by Systems Engineers. Fundamentals for architecting, designing and engineering large and complex systems. Software tools are covered with emphasis on architectural analysis and design, functional design alternatives, and key architectural attributes.

**SE5342: Project & Systems Engineering Management (3-0)**
Techniques and tools for Systems Engineering management. Topics include technical management, organizational environments and technical team structures, time and cost estimates and cost control, resource allocation and resource management. Students propose project studies, under the approval of the professor, to be developed in phases as the course progresses.

**SE5343: Requirements Engineering (3-0)**
Methodologies, approaches, and techniques associated with requirement analysis and definition; process for defining requirements including feasibility studies, requirements elicitation, formal specification, modeling, validation, verification, and documentation.

**SE5344: Integration, Verification & Validation (3-0)**
Integration, Verification and Validation (IV&V) processes and recommended activities at different program phases. Includes verification planning, verification and validation methods during development, during launching and operations of the product/system. Test bed requirements and unitary test, subsystem tests and integration test data collection analysis and systems requirement validation. Test reporting and modification or change request processes that need to be initiated.

**SE5345: Special Project Practicum in Systems Engineering (3-0)**
Methodologies and processes applied to develop a project from the conceptual phase to prototype definition under the supervision of at least two (2) faculty members from participating departments. Students are encouraged to work on real customer projects.

**SE5346: Systems Architecture and Design**
Conceptual design of systems, considering the arrangements of components, and the relations among them, and the holistic attributes of the arrangements. Department of Defense Architectural Framework (DoDAF), Zachman Frameworks, and others frameworks. Top-level strategic design at the beginning of the life-cycle is stressed. Essential elements, decisions, rationales and behaviors are covered, as well as the necessity for broad engineering knowledge in the creation of architectural representations. Prerequisite: Departmental approval.

**SE5347: Systems Engineering Processes**
Creation of systems engineering processes over a wide variety of complex systems is covered. Analysis and design of system processes through models, methodologies and tools are taught. ANSI/EIA 632 is reviewed. Process as different from product, process started in the middle, efficiency, cycle-shortening, process development, integrated process sensing & control, evolution, and drift correction are covered. Prerequisite: Departmental approval.
SE5348: Systems Modeling and Simulation

Systems Modeling Language (SysML) is taught as a systems-oriented customization of the object-oriented software Unified Modeling Language (UML). This course covers model-based descriptions of systems, and executable simulations of systems as made possible by SysML supporting programs, currently Enterprise Architect. Prerequisite: Departmental approval.

SE5390: Systems Engineering Special Topics

Advanced topics of contemporary interest in Systems Engineering. May be repeated for credit when topic changes. Prerequisite: Instructor approval.

For more information, please see http://imse.utep.edu/ and contact a faculty advisor.