

## Systems Engineering

### SE 500 Engr Probability & Statistics 3 cr

Probability and statistical concepts; discrete, continuous, and joint distributions; point and interval estimation; hypothesis testing; regression and correlation analysis; analysis of variance.

### SE 501 Engineering Optimization 3 cr

Model construction, linear programming, network models, dynamic models, stochastic models, queuing theory, and decision theory.

Pre-requisite: SE 500 Minimum Grade of B. SE 500 can be taken concurrently with this course.

### SE 601 Systems Eng Fundamentals 3 cr

Fundamentals of systems engineering, structure of complex systems, system development process, systems engineering management and documentation, needs analysis, requirements development, engineering design and development, integration and test, change management, process improvement. Fee.

### SE 602 Risk and Failure Analysis 3 cr

Risk Analysis needs, risk analysis methods, performance requirement analysis, trade studies, failure analysis needs, failure analysis tracking, and failure analysis methods.

Pre-requisites: Requires a background in calculus-based statistics and permission of instructor. Fee.

### SE 603 Integration, Test & Evaluation 3 cr

Interface control documents, design reviews, requirements management, allocation of test methods to requirements, test plans, test procedures, test execution, and failure tracking and resolution. Fee.

Pre-requisite: SE 601 Minimum Grade of C.

### SE 604 Software Systems Engineering 3 cr

Software development methodologies, software development tools, change management, software concept development, software requirements development and allocation, coding and unit test, program technical interfaces, software engineering management. Fee.

Pre-requisite: SE 601 Minimum Grade of C.

### SE 605 Project Engineering 3 cr

Management of system design, development and risk, work breakdown, structure, systems engineering management plan, design reviews, budget and schedule analyses, negotiation and conflict resolution, contracts, customer interactions, team selection, failure resolution. Fee.

### SE 606 Systems Architecture 3 cr

The systems architecture is that foundational structure of a system, capturing the core capability and structure of the system. This course will cover principles of systems architecting, system architecture drivers, relationship of systems architecture to system requirements, common tools and techniques to include design structure matrices, IDEFO, SysML, and simulation.

Pre-requisite: SE 601 Minimum Grade of C.

### SE 607 Systems Simulation 3 cr

This course rigorously examines system modeling and simulation methodologies, emphasizing statistical analysis and discrete-event simulation via simulation software.

### SE 608 Reliability Engineering 3 cr

This course rigorously examines reliability, and maintainability methodologies, emphasizing mathematical constructs, design concepts, and data analysis employed to quantify reliability, availability, and maintainability measures for operational readiness, support system design, and system effectiveness.

### SE 609 Engineering Research Methods 3 cr

This course is a fast tracked course examining quantitative and qualitative methods for conducting meaningful inquiry and research. Topics include research ethics, intent, design, methodologies, techniques, formatting, data management, analysis, publication, and presentation utilizing common statistical approaches.

### SE 610 Systems Thinking 3 cr

The act of systems thinking is taking a step back from the details considered during engineering design, and looking at the whole picture. This class exposes the student to a conceptual framework to allow them to properly define complex systems and enterprises drawing from synthesizing techniques from systems science, soft systems methodologies, and systems engineering. The class demonstrates the ability to leverage the simultaneity of perspectives, the role of paradox, and the centrality of soft issues in resolving complexity.

### SE 611 Socio-Technical Systems 3 cr

Socio-Technical systems are those systems which contain and/or are strongly influenced by human, social and institutional elements. Because of those influences, they quickly become dependent on community partnerships, infrastructure constraints, and government-aspects that are not traditionally part of the engineering equation. This course considers the systems engineering approach as it relates to the challenges of socio-technical systems.

Pre-requisite: SE 601 Minimum Grade of C.

### SE 612 Production System Engineering 3 cr

This course rigorously examines principles, design, models and techniques for operational planning and analysis of production and distribution systems emphasizing quantitative methods.

### SE 690 Special Topics in SE 3 cr

Topics of current interest in Systems Engineering. Fee.

### SE 692 Directed Studies 3 cr

Directed study, under the guidance of a faculty advisor, of a topic from the field of Systems Engineering not offered in a regularly scheduled course. Prerequisite: Instructor's permission.

**SE 699 Dissertation****1 TO 6 cr**

An investigation of an original problem in Systems Engineering under the guidance of the student's major professor. Prerequisite: Approval of the dissertation prospectus by the student's Advisory Committee, the Graduate School, and consent of the Director of Engineering Graduate Studies.