

SYSTEMS ENGINEERING (SENG)

SENG 3300 Engineering Economics

Principles of engineering economics including economic equivalence, time value of money, analysis of single and multiple investments, comparison of alternatives; capital recovery and tax implications; certainty; uncertainty; risk analysis; public sector analysis and break-even concepts. Interchangeable with ENGR 3300.

Prerequisites: MATH 2414.

SENG 3310 Intro to Control Systems

Analysis and synthesis of controlled, dynamic, linear mechanical, electrical, fluid and/or thermal systems; introduction to concepts of stability, controllability, and observability. Optimal control systems and nonlinear control theory.

Prerequisites: CSCE 1336, CSCE 1136, ENGR 2305, MATH 3310 and MATH 3330.

SENG 3320 Engineering Modeling & Design

This course will cover the fundamentals of modeling and design, introduce students to engineering design criteria such as human factors and ergonomics, maintainability, and reliability. The course will also introduce students to project management topics such as project scheduling, schedule reduction, design and project selection models, and multi-criteria decision making. Contemporary case studies of failures in modeling and design will be analyzed to identify lessons learned.

Prerequisites: ENGR 2372

SENG 3330 Operations Research I

Introduction to the fundamental deterministic analytical methods and their applications to the industrial and systems engineering. Modeling and decision making. Methods include linear programming, the simplex method, integer programming, distribution and network models (transportation, transshipment, and assignment problems), nonlinear programming, queuing analysis, simulation, and forecasting.

Prerequisites: MATH 3310 and SENG 3320.

SENG 3337 Software Development

This course will cover advanced software development techniques including object-oriented programming, inheritance, polymorphism, formatted file access, recursion, functional and operator overloading, parsing using a FSM, stacks and queues using linked list, search algorithms using binary search trees, and shortest path algorithms.

Prerequisites: CSCE 1336 and CSCE 1136.

SENG 3340 Robotics and Automation

Study of the use, design, and deployment of industrial automation and robotics technologies in high-precision, multi-product manufacturing environments. Robot manipulators, kinematics and dynamics, robot automation and control, integrated robotic systems for manufacturing, automation in manufacturing, programmable logic controllers, applications to industrial systems. Interchangeable with CSCE 3345.

Prerequisites: ENGR 2305, ENGR 2105, and MATH 3310

SENG 3345 Microprocessor Systems

Introduces basic computer structure, the instruction set, addressing modes, assembly language programming, assembly language subroutines, arithmetic operations, programming in C, implementation of C procedures, elementary data structures, input and output, and a survey of microprocessor-based design. This course is interchangeable with CSCE 3340.

Prerequisites: CSCE 2330

SENG 3370 Computer Int Manufacturing

Programmable automation applied to manufacturing systems. Sensors and data acquisition. Continuous and discrete control system design and analysis. Computer control of manufacturing processes and integration. Communications through local areas networks.

Prerequisites: Junior or Senior standing.

SENG 3380 Measurements and Devices

Basic concepts and principles of measurement methods; characteristics of signals; signal conditioning; data acquisition and processing; transducers and sensors, analog and digital devices, voltage regulators; power supplies; measurements of temperature, pressure, velocity, flow, and strain.

Prerequisites: ENGR 2305/2105.

SENG 4152 Internship in Systems Engr

A directed internship in an organization appropriate to the student's career objectives. May be repeated for credit. Evaluation of performance is on a Pass or Fail basis.

Prerequisites: Permission of instructor.

SENG 4185 Special Topics in Systems Engr

Topics may be from any area of Systems Engineering. May be repeated when topic changes.

Prerequisites: Senior standing or permission of instructor

SENG 4195 Undergraduate Research

Permits work on a research engineering project. May be repeated for credit.

Prerequisites: Permission of instructor.

SENG 4199 Directed Study in SENG

A directed study course. Topics selected from contemporary developments in the field of systems engineering. May be repeated for credit.

Prerequisites: Permission of instructor.

SENG 4252 Internship in Systems Engr

A directed internship in an organization appropriate to the student's career objectives. Evaluation of performance is on a Pass or Fail basis.

Prerequisites: Permission of instructor.

SENG 4285 Special Topics in Systems Engr

Topics may be from any area of Systems Engineering.

Prerequisites: Senior standing or permission of instructor

SENG 4295 Undergraduate Research

Permits work on a research engineering project.

Prerequisites: Permission of instructor.

SENG 4299 Directed Study in SENG

A directed study course. Topics selected from contemporary developments in the field of systems engineering.

Prerequisites: Permission of instructor.

SENG 4301 Senior Design I

This course is the first in the senior design sequence. It will cover principles of project management; planning, scheduling, and control; engineering proposals; and technical reports. Students prepare proposals, including specifications, timelines, schedule, and budget, for projects to be implemented in SENG 4390. This course should be taken the semester preceding SENG 4390. (Formerly SENG 3301).

Prerequisites: ENGL 2311 and senior standing

SENG 4315 Embedded Systems

Characteristics of embedded systems, microprocessors and microcontrollers, system design, modular programming, interface devices, memory management, interrupts, input/output applications, multitasking, and simulation.

Interchangeable with CSCE 4315.

Prerequisites: ENGR 2305, ENGR 2105, CSCE 1336, and CSCE 1136.

SENG 4330 Operations Research II

This course will present mathematical models for inventory management. It also covers a variety of statistics topics such as analysis of variance (One Factor and Two Factors), simple and advanced multiple linear regression. Techniques to deal with collinearity in datasets such as stepwise regression and best subsets are presented. Other topics include game theory, Markov chains, and multi-criteria decision-making through goal programming

Prerequisites: ENGR 2372 and SENG 3330.

SENG 4340 Intelligent Systems

Introduction to methods for the analysis and design of intelligent engineering systems. Topics include reinforcement learning, optimal estimation, Bayesian networks, expert systems, neural networks, and genetic algorithms. Applications emphasize control and decision-making in engineering, finance, and computer science. Interchangeable with CSCE 4340.

Prerequisites: SENG 3340.

SENG 4350 Facilities Design & Logistics

Design and analysis of models and algorithms for facility location, vehicle routing, and facility layout problems. Emphasis will be placed on both the use of computers and the theoretical analysis of models and algorithms in the design of production/service facilities, sequencing, and scheduling. Fundamental concepts applied through a sequence of design projects.

Prerequisites: SENG 3330.

SENG 4352 Internship in Systems Engr

A directed internship in an organization appropriate to the student's career objectives.

Prerequisites: Permission of instructor.

SENG 4360 Systems Simulation

Study the structure, logic, methodologies, and computer techniques for simulating systems. Topics include fundamentals of discrete simulation, design-modeling and subsequent analysis, model verification and validation, and understanding and predicting the behavior of systems.

Prerequisites: SENG 3330.

SENG 4370 Intro to Virtual Manufacturing

Introduction to virtual manufacturing, virtual reality applications in manufacturing systems design, networked manufacturing applications, and modeling of occupational safety engineering.

Prerequisites: SENG 3370.

SENG 4385 Special Topics in Systems Engr

Topics may be from any area of systems engineering. May be repeated when topic changes.

Prerequisites: Senior standing or permission of instructor.

SENG 4390 Senior Design II

This course is the second and final course in the senior design sequence. This course provides students the experience of implementing (including building, testing, and documenting) the approved project in SENG 4301, within budget and on schedule. Requires integration of knowledge from required systems engineering courses. Course requirements include a written report and oral presentation.

Prerequisites: SENG 4301.

SENG 4395 Undergraduate Research

Permits work on research engineering project.

Prerequisites: Permission of instructor.

SENG 4399 Directed Study in SENG

A directed study course. Topics selected from contemporary developments in the field of systems engineering.

Prerequisites: Permission of instructor.

SENG 5200 Concepts in Numerical Methods

This course provides the foundation in numerical methods necessary for admission to the Master of Science in Systems Engineering program. Grading for the course is on a Pass/Fail basis.

SENG 5201 Concepts in Prgrm & Comp Tools

This course provides the foundation in programming and computational tools necessary for admission to the Master of Science in Systems Engineering program. Grading for the course is on a Pass/Fail basis.

SENG 5202 Concepts in Engineering

This course provides the foundation in automation necessary for admission to the Master of Science in Systems Engineering program. Grading for the course is on a Pass/Fail basis.