

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 3301 Engr Proj Mgt & Proposals

Principles of project management; planning, scheduling, and control. Engineering proposals; 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.

Prerequisites: ENGL 2311 and senior standing.

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: ENGR 2305, MATH 3310, MATH 3330, COSC 1336 and COSC 1136.

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: Junior Standing.

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: COSC 1336 and COSC 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.

Prerequisites: SENG 3310.

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. Evaluation of performance is on a CR/NC basis.

Prerequisites: Permission of instructor.

SENG 4195 Undergraduate Research

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

Prerequisites: Permission of instructor.

SENG 4199 Independent Study in SENG

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

Prerequisites: Permission of instructor.

SENG 4252 Internship in Systems Engr

A directed internship in an organization appropriate to the student's career objectives. May be repeated. Evaluation of performance is on a CR/NC basis.

Prerequisites: Permission of instructor.

SENG 4295 Undergraduate Research

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

Prerequisites: Permission of instructor.

SENG 4299 Independent Study in SENG

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

Prerequisites: Permission of instructor.

SENG 4301 Engr Project Mgt and Proposals

Principles of project management; planning, scheduling, and control. Engineering proposals; 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 and COSC 1336 or CSCE 1336.

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.
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. May be repeated. Evaluation of performance is on a CR/NC basis.
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 4380 Syst Eng in Oil and Gas Ind

Introduction to the interdisciplinary approach between two different engineering disciplines: Petroleum Engineering and Systems Engineering.
Prerequisites: Senior standing.

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 Sys Eng Senior Design Project

This capstone course provides students the experience of implementing (including building, testing, and documenting) the approved project in SENG 3301, within budget and on schedule. Requires integration of knowledge from required systems engineering courses. Course requirements include a written report and oral presentation. To be taken during the semester of graduation.
Prerequisites: SENG 4301.

SENG 4395 Undergraduate Research

Permits work on research engineering project. May be repeated.
Prerequisites: Permission of instructor.

SENG 4399 Independent Study in SENG

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