

INDUSTRIAL ENGINEERING (IEEN)

IEEN 2302 Engineering Economics

3 Semester Credit Hours (3 Lecture Hours)

(3:0) Engineering management relies on the knowledge of engineering economics to be able to evaluate projects from a financial perspective. Optimizing financial performance of a project is a key responsibility of the engineer in the decision-making process. Examples of engineering projects would include but not limited to equipment replacement analysis, planning a new product line, and waste management. This course is designed to present engineering students the major concepts and techniques of engineering economic analysis that are needed in the decision-making process. The emphasis of this course is on the analytical analysis of money and its impact on decision making.

Prerequisite: MATH 2413.

IEEN 3302 Operations Research

3 Semester Credit Hours (3 Lecture Hours)

Introduction to operations research, linear programming, duality, other algorithms for linear programming, the transportation and assignment problems, dynamic programming, integer programming; offered: Fall and Spring.

Prerequisite: MATH 2414 and (MATH 3311* or MEEN 3310*).

* May be taken concurrently.

IEEN 3320 Human Factors

3 Semester Credit Hours (3 Lecture Hours)

The principles of the life sciences, engineering, and mathematics are applied to the investigation of existing and proposed socio-technical systems. Methods for the reduction of fatigue and human error are taught. Various fields of human factors and the fundamental concepts of the discipline are introduced. This course provides the basics of human perceptual, cognitive, and motor abilities relevant to human factors. This course also offers class project opportunities gain experience using human factors knowledge in actual applied settings. Offered: Fall and Spring.

Prerequisite: ENGR 1312.

Co-requisite: MATH 3342.

IEEN 3324 Human Systems Interface

3 Semester Credit Hours (3 Lecture Hours)

The emphasis of this course is the design of the human-computer interface. The fundamental concepts of human-computer interaction and user centered design thinking are taught, through working in teams on an interaction design project, supported by lectures, readings, and discussions. The variety of evaluation methods and design principles of usable and appropriate computer interfaces are introduced based on psychological, social, and technical analysis. Topics will include usability and affordances, direct manipulation, systematic design methods, user conceptual models and interface metaphors, design languages and genres, human cognitive models, physical ergonomics, information and interactivity structures, and design tools and environments. Offered: Fall and Spring.

Prerequisite: ENGR 1312.

Co-requisite: IEEN 3320.

IEEN 3330 Robotics and Automation

3 Semester Credit Hours (3 Lecture Hours)

This course covers topics of concepts, principles, and relationships of automated assembly devices, computer aided drafting/design (CADD), computer-aided manufacturing (CAM), industrial robots, numerical control (NC), industrial lasers, programmable logic controllers (PLCs), automated guided vehicles (AGVs), flexible manufacturing systems (FMS), and computer-integrated manufacturing (CIM). Offered: Fall and Spring.

Prerequisite: ENGR 2460.

IEEN 4310 Process Engineering

3 Semester Credit Hours (3 Lecture Hours)

This course covers introduction to software design paradigms, system and software requirements, computer aided software engineering, and software design fundamentals using existing documentation for a proposed system. Relevant topics include in-depth survey of data flow-oriented, object-oriented, data-oriented, and real-time design. Team project involving the implementation of the proposed system using structured programming, information hiding, and strength and coupling measures is required. Each student will be required to make an oral presentation as part of the team project. Offered: Fall.

Prerequisite: IEEN 3330.

IEEN 4312 Experimental Design and Analysis

3 Semester Credit Hours (3 Lecture Hours)

Main coverage: Basic principles of experimental design; Randomization; Completely randomized design; Paired design; Randomized blocks, Latin Squares, Greco-Latin Squares and related designs; Factorial design; Blocking in factorial design; 2k factorial design; Extension of 2k factorials; Blocking and confounding in 2k factorials; Partial confounding; Fractional factorial designs; Blocking in fractional factorials; Nested and split-plot designs; Replicated and un-replicated designs; Regression, ANOVA, and follow-up analysis; Sample size determination; Response surface model. Offered: Fall and Spring

Prerequisite: IEEN 3302 and 3320.

IEEN 4322 Cognitive Ergonomics

3 Semester Credit Hours (3 Lecture Hours)

This course is concerned with mental processes, such as perception, decision making, memory, reasoning, and response execution, as they affect interactions among humans and other elements of a work system. Relevant topics include skilled performance, attention, distraction, human error, work stress, risk perception, and Kansei engineering as these may relate to human-system design, safety and productivity. Assessment methodologies include hierarchical task analysis, cognitive task analysis, mental workload, human error identification/accident investigation, and situation awareness assessment. Offered: Fall.

Prerequisite: IEEN 3320.

IEEN 4324 Human Factors and Autonomous Systems

3 Semester Credit Hours (3 Lecture Hours)

This course introduces the survey of human factors and ergonomics with particular reference to human functions in human-machine systems and principles of human factors to demonstrate and apply a broad knowledge of various modern industrial engineering methods and tools associated with designing autonomous systems in manufacturing and other related fields. Applications of engineering design methods to represent, integrate and solve problems, including the ability to recognize problem context and integrate knowledge and skills appropriate sources are provided. Knowledge of basic human capabilities and the ways that these capabilities are taken into account in the design of human-machine systems and work environments. Offered: Fall.

Prerequisite: IEEN 3320.

IEEN 4326 Airborne Design of Experiments

3 Semester Credit Hours (3 Lecture Hours)

Definitions, concepts, and history, Aviation Human Factors, management, and the organization, Human performance in aviation operations, Human information processing and operational decision-making, Human error and threat management, Threat and Error Management (TEM) in flight operations, air traffic control and cabin operations, Resource management training on the flight deck and in air traffic control, Automation in the workplace, The design of Standard Operating Procedures (SOPs) and checklists. Offered: Fall and Spring.

Prerequisite: IEEN 3302.

IEEN 4330 Digital Systems Simulation

3 Semester Credit Hours (2 Lecture Hours, 2 Lab Hours)

Introduction (definitions and types of simulations), Mechanism of discrete event simulation, Random number/variante generation, Input data analysis (input distribution modeling), Simulation modeling using Arena package, Review of probability and statistics, Simulation output analysis, Monte Carlo simulation, Modeling continuous processes, Verification and validation of simulation models, Read/write simulation data from/to external files. Offered: Fall and Spring.

Prerequisite: IEEN 3302.

IEEN 4332 Distribution Center Design and Operation

3 Semester Credit Hours (3 Lecture Hours)

Introduction (issues, equipment, processes), layout, order-picking, automation, special topics: crossdocking, warehouse performance. Offered: Fall and Spring.

Prerequisite: IEEN 3330.

IEEN 4334 Scheduling and Sequencing

3 Semester Credit Hours (3 Lecture Hours)

Introduction and overview, EOQ Models, MRP, job shop scheduling rules & Gantt chart, algorithms for one machine problems, implicit enumerations & dynamic program, branch and bound, heuristics approaches, project Scheduling, parallel Machine Scheduling, relaxation of Assumptions, batch processing, sequence dependence, project presentations. Offered: Fall and Spring.

Prerequisite: IEEN 3302.

IEEN 4342 Construction Management

3 Semester Credit Hours (3 Lecture Hours)

The course focuses on management techniques to solve the unique problems associated with a construction project. Study of Construction Management functions including Project Management, Cost Management, Time Management, Quality Management, Contract Administration, and Safety Management will be covered. Emphasis is put on the application of each function throughout the project phases. Offering: Spring.

Prerequisite: IEEN 2302 and 3320.

IEEN 4396 Directed Independent Study

1-3 Semester Credit Hours

Requires a formal proposal of study to be completed in advance of registration, approval of supervising faculty and department chairperson. Offered Fall, Spring, and Summer.