EIND - Industrial Engineering

EIND 101. Introduction to Industrial & Management Systems Engineering, 1 Credit. (1 Lec) F
PREREQUISITE: Must be taken the first year enrolled in IE program. Overview of the industrial engineering profession. Lectures will concentrate on tools and methods of industrial and management system engineering, and their application in manufacturing and service industries.

EIND 142. Introduction to Systems Engineering, 2 Credits. (1 Lec, 1 Lab) S
Introduce students to the methods used by industrial engineers to improve efficiency and safety of human-based systems. Labs will include hands-on activities and plant tours. Contemporary industrial engineering topics will be introduced, such as designing for the environment and sustainability.

EIND 290R. Undergraduate Research. 1-6 Credits. (1-6 Ind; max unlimited) F,S
Directed undergraduate research which may culminate in a written work or other creative project. Course will address responsible conduct of research. May be repeated.

EIND 291. Special Topics. 1-4 Credits. (1 Lec; 12 cr max) On Demand
PREREQUISITE: None required but some may be determined necessary by each offering department. Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

EIND 300. Engineering Management & Ethics. 3 Credits. (3 Lec) F
PREREQUISITE: WRIT 101W, COMX 111US, and Junior standing. Introduction to management, leadership and organizational theory with applications to the engineering profession. Communication skills, social responsibility and ethical decision making for managers and engineers emphasized throughout. Cases and class exercises used to illustrate contemporary problems and environments.

EIND 313. Work Design and Analysis. 3 Credits. (2 Lec, 1 Lab) S
PREREQUISITE: WRIT 101W; EIND 142 for IE majors. Covers analysis and design methods for occupational tasks to improve productivity, workplace health, and safety. Topic areas include fundamental aspects of work standards development, ergonomics, and industrial safety. The labs demonstrate example applications of these topic areas.

EIND 354. Engineering Probability and Statistics I. 3 Credits. (3 Lec) F
PREREQUISITE: M 172Q, Junior standing, or consent of instructor. Understanding the statistical nature of engineering processes. Emphasis on proper data collection and classification, characteristics of variables and their distributions, joint probability distributions, and establishing hypotheses and statistical significance over engineering design specifications.

EIND 364. Principles of Operations Research I. 3 Credits. (3 Lec) F
PREREQUISITE: M 221. Formulation of models and optimization techniques to facilitate engineering management decisions. Resource allocation, transportation and multiple goals via networks, linear, and integer programming with primal-dual emphasis.

EIND 371. Introduction to Computer Integrated Manufacturing, 3 Credits. (2 Lec, 1 Lab) F
PREREQUISITE: ETME 215 or consent of instructor. Introduces core concepts of computer controlled manufacturing systems and their applications. Topics include fundamentals of automation, programmable logic controllers, numerical control, industrial robotics, material handling and storage, and flexible manufacturing systems. Laboratories require students to apply course concepts in solving simulated industrial problems, and implement hardware-software solutions to meet stated objectives.

EIND 373. Production Inventory Cost Analysis. 3 Credits. (3 Lec) S
PREREQUISITE: M 161O, M 165Q, or M 171O. Industrial cost systems, accounting processes, and cost estimation; cost analysis of manufacturing processes, economic decision making and uses of cost information in making product design and product line decisions.

EIND 410. Interaction Design. 2 Credits. (2 Lec) S
PREREQUISITE: EIND 313 or EGEN 310R (or equivalent) for Engineering majors. This course demonstrates the processes of integrating the psychology of the user into the design process as well as conducting usability testing to evaluate the design success. It emphasizes the need to understand the needs, capabilities, and emotions of the user to produce usable and desirable designs. Emphasis is placed on innovation in design to create enjoyable (fun) user experiences.

EIND 411. Interaction Design Project. 1 Credit. (1 Req) S
COREQUISITE: EIND 410. Applications of interaction design methods discussed in EIND 410 to an actual product or service concept (prototype), based on student project teams guided by faculty.

EIND 413. Ergonomics & Human Factors Engineering. 3 Credits. (3 Lec) F
PREREQUISITE: EGEN 205 or KIN 322; EIND 313 for IMSE majors; or consent of instructor. Applications of ergonomics and human factors engineering. Topics include principles of anthropometrics, biomechanics, bioinstrumentation, physiology, design error, design for special populations (e.g., those with disabilities), mental stress/workload, and risk assessment methods for work applied to common problems faced by engineers. Emphasis on design and analysis of occupational systems and consumer products which best "fit" job tasks or user requirements to human capabilities.

EIND 422. Introduction to Simulation. 3 Credits. (3 Lec) F
PREREQUISITE: CSCI 127 or equivalent, and EIND 354 or equivalent. Discrete simulation modeling methodology; sampling, output analysis, validation, and verification; application to varied systems design and analysis problems. Cross-listed with CSCI 477.

EIND 425. Technology Entrepreneurship. 3 Credits. (3 Lec) F
PREREQUISITE: EGEN 325 or EGEN 330 or equivalent. Introduction to principles of entrepreneurship and starting a business. Students learn how to formulate, plan, and implement a new venture, emphasizing the unique intellectual property, funding and marketing/selling concerns of technology startups. Includes extensive use of technology examples and case studies.

EIND 434. Project Management for Engineers. 3 Credits. (3 Lec) F
PREREQUISITE: Junior standing. Fundamental principles of planning and executing engineering and research projects, including estimating, budgeting, scheduling, controlling, software applications, and Agile project management approaches. Focus on management practices that drive success in domestic and international projects including team development and communication practiced through a term project.

EIND 442. Facility and Material Handling Systems Design. 3 Credits. (3 Lec) F
PREREQUISITES: IMSE seniors in their last full academic year, EIND 313, EMIE 103, ETME 215. COREQUISITE: EIND 300. Senior capstone course. The first course in the senior capstone sequence. Principles and techniques for planning and designing production facilities and material handling systems. Product and process analysis, requirements, layout and support facilities. Computer-aided analysis and design.

EIND 454. Engr Probability and Stats II. 3 Credits. (3 Lec) F
PREREQUISITE: EIND 354 or consent of instructor. Statistical analysis for managerial decision-making as applied to engineering problems. Single and multi-factor ANOVA, randomized complete, full-blown and fractional designs with blocking and confounding. Introductions to nested and split-plot designs, multiple regression and response surface designs.

EIND 455. DOE for Engineers. 3 Credits. (3 Lec) S
PREREQUISITE: EIND 354 or consent of instructor. Advanced topics in applied statistical analysis for engineers. Topics include regression techniques: ANOVA, simple linear regression, multiple linear regression, and variable selection procedures; and multivariate analysis techniques: principal components, factor analysis, canonical correlation analysis, and clustering methods. Statistical analysis for managerial decision-making as applied to engineering problems. Co-convened with EIND 557.

EIND 458. Production & Engineering Mgmt. 3 Credits. (3 Lec) S
COREQUISITE: EIND 464 or consent of instructor. Design and management of efficient production/delivery systems for goods and services, emphasizing quantitative analysis and systems approaches. Topics include forecasting, inventory management, production planning, scheduling, material planning, and lean manufacturing systems.

EIND 464. Prin of Operations Research II. 3 Credits. (3 Lec) S
PREREQUISITE: EIND 354 and EIND 364. Advanced formulation of models, optimization techniques and application to engineering design and operations management decision making. Integer programming algorithms. Stochastic models including advanced queuing and general Markov processes.
EIND 468. Managerial Forecasting & Decision Analysis. 3 Credits. (3 Lec) F
PREREQUISITE: EIND 354. Time series analysis through classical approaches; auto-regression, smoothing models, and advanced time series models. Technical applications emphasized. Includes investigations into financial and dependent data. Approaches designed for managers to test real applications for making decisions.

EIND 477. Quality Management Systems. 3 Credits. (3 Lec) S
PREREQUISITE: EIND 354 or EGEN 350 or consent of instructor. Introduction to industrial methods used to improve the quality of products and services and their application. Quality management approached from both qualitative and quantitative (statistical) tools. Emphasis on Six Sigma methods through case studies and projects.

EIND 490R. Undergrad Research. 1-6 Credits. (1 Ind; 12 cr max) F,S,Su
PREREQUISITE: Junior standing, consent of instructor, and approval of certifying officer. Directed undergraduate research/creative activity which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research. May be repeated.

EIND 491. Special Topics. 1-4 Credits. (1-4 cr.)
PREREQUISITE: Course prerequisites as determined for each offering. Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

EIND 492. Independent Study. 1-3 Credits. (1 Ind; 6 cr max) F,S,Su
PREREQUISITE: Junior standing, consent of instructor, and approval of department head or director. Directed research and study on an individual basis.

EIND 499R. Industrial Engineering Design Capstone. 3 Credits. (1 Lec, 2 Rct) F
PREREQUISITE: EGEN 310R, EGEN 325, EIND 300, EIND 434 and EIND 442. COUREREQUISITE: EIND 458. Second course in senior capstone sequence. An open-ended team design project emphasizing the application of industrial engineering tools and knowledge to create designed solutions for real business needs or opportunities. Experiential learning, oral and written communication and project management emphasized. Co-convened with EFIN 499R.

EIND 500. Engineering Organizational Change and Innovation. 3 Credits. (1 Lec, 2 Rct) F
PREREQUISITES: EIND 300 or EIND 574 or consent of instructor. Advanced topics in organizational change management and innovation viewed from an engineering perspective. Emphasis placed on understanding the need for change, systems thinking approaches, the role of corporate culture and leadership, and ethical approaches to change management. The differing role of employees and management in innovation and implementing engineering process improvement are examined.

EIND 506. Healthcare Delivery Systems. 3 Credits. (3 Lec) S even years
PREREQUISITES: NRSG 505 or EIND 458 or consent of instructor. This interdisciplinary course targets nursing students pursuing certification as a Clinical Nurse Leader and Industrial Engineering students who intend to work in the healthcare sector. Students will learn strategies for analyzing and improving processes, coordinating interdisciplinary healthcare teams, enhancing healthcare quality management, and reducing health risk through medical error elimination. This course is cross listed with NRSG 608.

EIND 509. Systems Simulation. 3 Credits. (3 Lec) F
Alternate Odd Years PREREQUISITE: CSIC 111 or CSIC 127, EIND 354, EIND 422; or consent of instructor. Systems exhibiting randomness are modeled and statistically analyzed using a state-of-the-art simulation language. Graphical model animation, and advanced output analysis are emphasized. Applications include improvement of existing and design of new production and service systems.

EIND 510. Design for Usability and Persuasion. 3 Credits. (3 Lec) F
PREREQUISITE: EIND 410 or EGEN 310R or consent of instructor. Usability engineering is an iterative design process that applies human-centered design principles to produce usable, desirable, and sustainable products, services and systems. The goal is to meet the needs of the user. In contrast, methods of persuasive design seek to guide user behavior toward the needs of others who may benefit from the purchase and use of these products and systems. This project-based course will use a seminar format with industry guest speakers from various disciplines to examine the methods and ethics of usability and persuasive design.

EIND 511. Advanced Human Factors. 3 Credits. (3 Lec) F
PREREQUISITE: Basic knowledge of statistics and advanced topics (ANOVA, regression, design of experiments) or consent of instructor. Advanced research methods applied to areas where ergonomics and human factors is playing a key role in increasing effectiveness, efficiency and safety of human-based systems. Example application areas include: (1) transportation systems; (2) health care systems; and (3) occupational work.
EIND 598. Internship. 1-12 Credits. (1-3 Ind) F,S,Su
PREREQUISITE: Graduate standing; consent of instructor and approval of graduate program coordinator. An individualized assignment arranged with an agency, business or other organization to provide guided experience in the field.

EIND 690. Doctoral Thesis. 1-10 Credits. (1-10 Ind) F,S,Su
PREREQUISITE: Doctoral standing; consent of instructor.
Font Notice

This document should contain certain fonts with restrictive licenses. For this draft, substitutions were made using less legally restrictive fonts. Specifically:

Times was used instead of Adobe Garamond Pro.

The editor may contact Leepfrog for a draft with the correct fonts in place.