### 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 172, 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 161, M 165, or M 171. 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 310 (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 Re) 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:** Junior standing; 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 111 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

**PREREQUISITE:** IMSE seniors in their last full academic year, EIND 313, EMEC 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) On Demand

**PREREQUISITE:** EIND 354. Identification, characterization, and analysis of variation in engineering data. Includes inferential statistics, goodness of fit, applications of non-parametric statistics, curve fitting, regression, and the design of engineering experiments. A team design project is required.

**EIND 455. DOE for Engineers. 3 Credits.** (3 Lec) S, odd years

**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 457. Regres & Multivar Analysis. 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.
Laboratory demonstrations and case studies.

Quality Management Systems. Basic and applied issues of human cognition, emotion, culture, and human error in the failure of safety-critical systems. Emphasis is on understanding design for the health and safety at work. Topics include the skeletal system, physiology, fatigue assessment, stress response, psychometrics, biomechanics, work design assessments and implementation of ergonomics programs.

Multi-Attribute Analysis. Theory, methods and applications pertinent to decision making with multiple attributes and/or multiple objectives. Special emphasis is given to multi-attribute utility theory, goal programming, and multiple criteria optimization decision-making in modern manufacturing and service systems and in design decision-making to support competitive priorities of an enterprise.

DOE for Engineers. Statistical analysis for managerial decision-making applied to engineering problems. Single and multi-factor ANOVA, randomized complete and fractional factorial designs with blocking and confounding. Introductions to nested and split-plot designs, multiple regression and response surface designs.

Regression & Multivar Analysis. 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. This course is co-convened with EIND 457.

Manage Forecast & Dec Analysis. Time series analysis through classical approaches including regression, smoothing models, and advanced time series models. Technical applications emphasized in concepts, tools, and methods. Includes investigations into financial and dependent data. Approaches designed for managers to test real applications for making decisions.

Management Engineering Systems. 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.

Healthcare Delivery Systems. 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.

Systems Simulation. 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.

Usability Engineering. An iterative design process that applies human-centered design principles integrated with user participation (usability testing) to produce usable, desirable, and sustainable products, services and systems. This project-based course will use a seminar format with industry guest speakers from various disciplines.

Advanced Human Factors. 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.

Human Factors in the Safety of Complex Systems. Advanced topics in human factors engineering applied to the understanding of human error in the failure of safety-critical systems. Emphasis is on understanding the system and human basis of failure in order to design systems with greater resilience. Basic and applied issues of human cognition, emotion, culture, and skill in relation to human error and systems safety are explored through seminars, laboratory demonstrations and case studies.

Occupational Biomechanics. Basic knowledge of statistics (t-tests, ANOVA, regression, design of experiments); EIND 413 or consent of instructor. Topics relate to occupational biomechanics and bioinstrumentation application, focused on designing for the health and safety at work. Topics include the skeletal system, physiology, fatigue assessment, stress response, psychometrics, biomechanics, work design assessments and implementation of ergonomics programs.
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.