EIND - Industrial Engineering

EIND 101 Introduction to Industrial & Management Systems Engineering: 1 Credits (1 Lec)
(F) Overview of the profession including the breadth of career opportunities available to Industrial and Management Systems Engineers. Course focuses on common tools and methods of Industrial and Management System Engineering, how those tools are utilized to improve outcomes for organizations in many sectors of the economy, and the benefits to society from these applications.

EIND 142 Introduction to Systems Engineering: 2 Credits (1 Lec, 1 Lab)
(Sp) Introduces students to the importance of systems thinking including recognizing systems and understanding how they function and interact. Includes exploring the role of Industrial and Management Systems Engineers in analyzing, designing, and managing human-centered systems. Labs provide hands on opportunities for this exploration. Emphasis on contemporary topics including automation, social justice, and sustainability.

EIND 290R Undergraduate Research: 1-6 Credits (1-6 Other)
(F, Sp, Su) Directed undergraduate research which may culminate in a written work or other creative project. Course will address responsible conduct of research. May be repeated.
Repeatable up to 99 credits.

EIND 291 Special Topics: 1-4 Credits (1 Lec)
PREREQUISITE: None required but some may be determined necessary by each offering department. On demand. 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
Repeatable up to 12 credits.

EIND 300 Engineering Management & Ethics: 3 Credits (1 Lec, 2 Other)
PREREQUISITE: WRIT 101W and COMX 111US and Junior standing. (F) 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)
PREREQUISITE: WRIT 101W and EIND 142 for IMSE majors, Instructor permission for non-IMSE majors. (Sp) 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)
PREREQUISITE: M 172, Junior standing, or consent of instructor. (F) 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)
PREREQUISITE: M 221. (F) 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)
PREREQUISITE: ETME 215 or consent of instructor. (F) 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)
PREREQUISITE: M 161Q, M 165Q, or M 171Q. (Sp) This course is designed to give the engineering student an overview of the accounting processes used in service and manufacturing businesses today, including financial and managerial accounting practices. Understanding topics such as cost analysis of manufacturing processes; budgeting; break-even analysis; financial statement analysis; and internal controls supports engineers when making product design and product line decisions

EIND 410 Interaction Design: 2 Credits (2 Lec)
PREREQUISITE: EIND 313 or EGEN 310R or consent of instructor. (Sp) This course focuses on the human-centered design process for products, services, and systems. It emphasizes the need to understand the needs, capabilities, and emotions of the user to produce designs that are not only usable and useful, but also desirable. Emphasis is placed on innovation in design to create enjoyable (fun) user experiences

EIND 411 Interaction Design Project: 1 Credits (1 Other)
COREQUISITE: EIND 410. (Sp) A team-based project based on knowledge and skills introduced in EIND 410 to develop a design concept for a product, service, or system to address issues of social justice

EIND 413 Ergonomics & Human Factors Engineering: 3 Credits (2 Lec, 1 Lab)
PREREQUISITE: EGEN 205 or KIN 322; EIND 313 for IMSE majors; or consent of instructor. (F) 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)
PREREQUISITE: CSCI 127 or equivalent, and EIND 354 or equivalent. (F, Su) Discrete simulation modeling methodology; sampling, output analysis, validation, and verification; application to varied systems design and analysis problems

EIND 425 Technology Entrepreneurship: 3 Credits (3 Lec)
PREREQUISITE: EGEN 325 or EGEN 330 or equivalent. (F) The purpose of this course is to Introduce students to the principles of entrepreneurship and give them the background appropriate to start their own business. The course utilizes the Lean Launch Pad approach to evaluating a concept value in the market. Building business models and understanding the market opportunity are key aspects of this course. Multiple case studies are developed and presented by the students. Multiple guest lectures by entrepreneurial leaders augments the course learning

EIND 434 Project Management for Engineers: 3 Credits (3 Lec)
PREREQUISITE: Junior standing. (F) Fundamental principles of planning, estimating, budgeting, scheduling, implementing, evaluating, and controlling engineering and research projects. Common engineering management concerns such as labor scheduling, human resource management, international impacts, agile project management approaches, and related governmental compliance are also explored. These principles are practiced through several projects throughout the semester

EIND 442 Facility and Material Handling Systems Design: 3 Credits (3 Lec)
PREREQUISITE: EIND 313, EMEC 103, ETME 215
COREQUISITE: EIND 300. (F) IMSE seniors in their last 3 semesters. 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
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EIND 454 Engr Probability and Stats II: 3 Credits (3 Lec)
PREREQUISITE: EIND 354. () Offered on demand. 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 Design of Experiments for Engineers: 3 Credits (3 Lec)
PREREQUISITE: EIND 354 or consent of instructor. (Sp) Odd years. 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)
PREREQUISITE: EIND 354 or consent of instructor. (Sp) Even years. 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

EIND 458 Production & Engineering Mgmt: 3 Credits (3 Lec)
COREQUISITE: EIND 464 or consent of instructor. (Sp) 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)
PREREQUISITE: EIND 354 and EIND 364. (Sp) 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)
PREREQUISITE: EIND 354. (F) 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)
PREREQUISITE: EIND 354 or EGEN 350 or consent of instructor. (Sp) 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 (1-6 Other)
PREREQUISITE: Junior standing, consent of instructor, and approval of certifying officer. (F, Sp, Su) 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
Repeatable up to 6 credits.

EIND 491 Special Topics: 1-4 Credits (1 Lec)
PREREQUISITE: Course prerequisites as determined for each offering. On demand. 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
Repeatable up to 12 credits.

EIND 492 Independent Study: 1-6 Credits (1-6 Other)
PREREQUISITE: Junior standing, consent of instructor, and approval of department head or director. (F, Sp, Su) Directed research and study on an individual basis
Repeatable up to 6 credits.

EIND 499R Industrial Engineering Design Capstone: 3 Credits (1 Lec, 2 Other)
PREREQUISITE: EGEN 310R, EGEN 325, EIND 434 and EIND 442
COREQUISITE: EIND 458. (Sp) Second course in senior capstone sequence. An open-ended team design project emphasizing the application of industrial engineering tools and knowledge to create engineered solutions for real business needs or opportunities. Experiential learning, oral and written communication and project management emphasized
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EIND 500 Engineering Organizational Change and Innovation: 3 Credits (1 Lec, 2 Other)
PREREQUISITE: EIND 300 or EIND 574 or consent of instructor. (F) Advanced topics in organizational change and innovation from an engineering perspective. Emphasis placed on understanding the need for change, systems thinking, the role of culture and leadership, and ethical approaches to change. 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)
PREREQUISITE: EIND 458 or NRSG 604 or consent of instructor. () Offered Spring, even years. 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

EIND 509 Systems Simulation: 3 Credits (3 Lec)
PREREQUISITE: CSCI 127 and EIND 354; or consent of instructor. () Offered Fall, odd years. 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 Usability and Inclusive Design: 3 Credits (3 Lec)
PREREQUISITE: EIND 410 or EGEN 310R or consent of instructor. () Offered Fall, odd years. Explores usability engineering and usability testing in the design of human centered systems. Focus is given to the inclusive design process for developing systems to meet the needs of all users and improve social justice

EIND 511 Advanced Human Factors: 3 Credits (3 Lec)
PREREQUISITE: EIND 354 or EGEN 350 or consent of instructor. () Offered Spring, even years. Advanced methods applied to areas where human factors and ergonomics are critical to diverse user groups with technology and service-based systems. This seminar-based course will use case studies to examine application areas such as healthcare, aviation and transportation

EIND 513 Human Factors in Complex Systems: 3 Credits (3 Lec)
PREREQUISITE: EIND 313 or EIND 413 or consent of instructor. () Offered Fall of even years. Focus on advanced topics in human factors engineering related to the origins of human error as causes of failure in safety-critical systems. This seminar-based course includes lab demonstrations of human cognitive functions and case studies of human error in safety critical systems

EIND 514 Occupational Biomechanics: 3 Credits (3 Lec)
PREREQUISITE: Knowledge of statistics (t-tests, ANOVA, regression, design of experiments); EIND 413 or consent of instructor. () Course is offered on demand. 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

EIND 525 Multi-Attribute Analysis: 3 Credits (3 Lec)
PREREQUISITE: EIND 364. () Offered Fall, even years. 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

EIND 554 DOE for Engineers: 3 Credits (3 Lec)
PREREQUISITE: EIND 354 or consent of instructor. () Offered Spring, odd years. 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. -

EIND 557 Regression & Multivar Analysis: 3 Credits (3 Lec)
PREREQUISITE: EIND 354 or consent of instructor. () Offered Spring, even years. Advanced topics in applied statistics 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. This course is co-convened with EIND 457

EIND 558 Manage Forecast & Dec Analysis: 3 Credits (3 Lec)
PREREQUISITE: EIND 354 or EIND 457. () Fall, even years. 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

EIND 574 Management Engineering Systems: 3 Credits (3 Lec)
PREREQUISITE: EIND 300 or EIND 500 or consent of instructor. () Offered Spring, odd years. Explores various facets of designing effective organizational and management systems. Topics include: classical and open system organization theory, socio-technical systems theory, congruence, technology and innovation management, knowledge management, and continuous improvement in organizations. Students complete an independent research project

EIND 575 Research or Prof Paper/Project: 1-6 Credits (1-6 Other)
PREREQUISITE: Graduate standing. (F, Sp, Su) A research or professional paper or project dealing with a topic in the field. The topic must have been mutually agreed upon by the student, major advisor, and graduate committee
Repeatable up to 6 credits.

EIND 589 Graduate Consultation: 1-3 Credits (1-3 Other)
PREREQUISITE: Master's standing and approval of the Dean of Graduate Studies. (F, Sp, Su) (F,S,SU) This course may be used only by students who have completed all of their coursework (and thesis if on a thesis plan) but who need additional faculty or staff time or help
Repeatable up to 3 credits.

EIND 590 Master's Thesis: 1-10 Credits (1-10 Other)
PREREQUISITE: Master's standing; consent of instructor. (F, Sp, Su) Master's Thesis
Repeatable up to 99 credits.

EIND 591 Special Topics: 1-4 Credits (1 Lec)
PREREQUISITE: Upper division courses and others as determined for each offering. On demand. 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
Repeatable up to 12 credits.

EIND 592 Independent Study: 1-3 Credits (1-3 Other)
PREREQUISITE: Graduate standing, consent of instructor, approval of department head or director. (F, Sp, Su) Directed research and study on an individual basis
Repeatable up to 6 credits.

EIND 598 Internship: 1-6 Credits (1-6 Other)
PREREQUISITE: Graduate standing, consent of instructor and approval of graduate program coordinator. (F, Sp, Su) An individualized assignment arranged with an agency, business or other organization to provide guided experience in the field
Repeatable up to 12 credits.

EIND 690 Doctoral Thesis: 1-10 Credits (1-10 Other)
PREREQUISITE: Doctoral standing; consent of instructor. (F, Sp, Su) Doctoral Thesis
Repeatable up to 99 credits.