Industrial and Systems Engineering

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Course Descriptions
Definition of Prefixes
EGN - Engineering General; EIN - Engineering: Industrial; ESI - Engineering Systems Industrial.
F-Fall semester offering; S-Spring semester offering; SS-Summer semester offering.

EGN 3124 Computer Assisted Drawing and Design (3). Application of computer assisted design technology to product design, feasibility study and production drawing. (F,SS)

EGN 5435 Product Modeling (3). Life cycle product data, geometry and form features, product information models and modeling techniques, product modeling systems, and product data standards. Prerequisites: EGN 3124 or equivalent.

EGN 5620 Enterprise Systems Configuration (3). Enterprise systems overview; major enterprise functions; standard operation procedures; system configuration and parameters; master data; user interfaces and reports; and hands-on experience. Prerequisite: Permission of the instructor.

EGN 5621 Enterprise Systems Collaboration (3). Collaborative engineering and environment; decision processes; changes management; virtual enterprise operation systems; and hands-on experience with a commercial enterprise operation system. Prerequisite: EGN 5622.

EGN 5622 Enterprise Systems Integration (3). Enterprise architectures; work flow modeling and design; systems integration methodology; vertical and horizontal integration; master data analysis and integration; and hands-on experience. Prerequisite: EGN 5620.

EGN 5623 Enterprise Systems Optimization (3). Supply networks overview; interactive supply network planning; optimal systems and process design; optimization techniques and heuristics; master and transaction data transfer; and hands-on experience. Prerequisite: EGN 5622.

EIN 1396C Basic Industrial Shop and Manufacturing Practices (3). Fundamentals of basic capabilities and requirements for a modern shop or industrial manufacturing facilities. Rudiments of safety requirements, wood technology, metal technology and plastic technology.

EIN 2100 Introduction to Industrial and Systems Engineering (1). A historic review of ISE origins, definition of role, functions and contributions of the IE in industry. Professional development opportunities. Practice communication skills. Seminars.

EIN 3235 Evaluation of Engineering Data I (3). Analysis of industrial data and subsequent characterization of industrial processes. Prerequisite: MAC 2312. (F,S,SS)

EIN 3331 Quality Control (3). Modern concepts for managing the quality function of industry to maximize customer satisfaction at minimum quality cost. The economics of quality, process control, organization, quality improvement, and vendor quality. Prerequisite: EIN 3235. (S,SS)

EIN 3354 Engineering Economy (3). Basic methods of engineering economic analysis including equivalence, value measurement, interest relationships and decision support theory and techniques as applied to capital projects. (F,S,SS)

EIN 3365 Facilities Planning and Materials Handling (3). Application of methods and work measurement principles to the design of work stations. Integration of work stations with storage and material handling systems to optimize productivity. Prerequisites: EGN 3124 and ESI 3321. (F)

EIN 3390 Manufacturing Processes (2). Study of interrelationships among materials, design and processing and their impact on workplace design, productivity and process analysis. Prerequisite: EGN 3365. Corequisite: EIN 3390L. (F,S,SS)

EIN 3390L Manufacturing Processes Laboratory (1). Experiments are conducted using the machines, equipment and tools in the laboratory to provide students with hands-on experience on product design, process planning, fabrication and quality assurance. Corequisite: EIN 3390. (Lab fees assessed). (F,S,SS)

EIN 3600 Industrial Automation (2). Basic concepts of industrial automation and robotics. Performance characteristics, criteria for use, planning, selection, and implementation of computer automated equipment. Open to non-majors. Prerequisite: ESI 3161. Corequisite: EIN 3600L. (F)

EIN 3600L Industrial Automation Lab (1). Experiments in the use of CNC machines and robots demonstrating performance characteristics of CNC equipment and robotic arms. Corequisite: EIN 3600. (Lab fees assessed). (F)

EIN 3949 Industrial Engineering Co-Op (1-3). Entry level work experience as an Industrial Engineering intern. Jointly supervised by IE and industry personnel. Written report required. Student must obtain approval from IE faculty and sign up for course before starting work. Prerequisite: Approval of advisor. (F,S,SS)

EIN 4102 Collective Bargaining in Industrial Systems (3). A comprehensive study of collective bargaining with emphasis upon the private sector. Included will be negotiations and scope of contracts, day-to-day contract administration, and major bargaining issues. Prerequisite: Senior Standing (SS)

EIN 4103 Fundamentals of Engineering Regulation (3). A survey of the legal and regulatory requirements encountered by engineers. Included will be patents, antitrust, safety environmental, compliance, labor laws, product liability and global issues. Prerequisite: Senior standing.

EIN 4104 Introduction to Engineering Management (3). Organization of engineering systems including production and service organizations. Inputs of human skills, capital, technology, and managerial activities to produce useful products and services. Prerequisite: Permission of advisor.

EIN 4116 Industrial Information Systems (3). The integration of information flows and data bases with the production planning and control systems into productive and manageable systems. Prerequisite: Programming language. (S)

EIN 4122 Industrial Marketing (3). The performance of business activity that directs the flow of goods and services from producer to industrial user. Covers new product development, marketing research, sales engineering, pricing, distribution, and promotion. (F)

EIN 4214 Safety in Engineering (3). Introduces occupational safety and health hazards associated with mechanical systems, materials handling, electrical systems, and chemical processes. Illustrates controls through engineering revision, safeguarding, and personal protective equipment. Emphasis placed on recognition, evaluation and control of occupational safety and health hazards. Prerequisites: EIN 4314 or permission of the instructor. (S)

EIN 4220 Introduction to Total Quality Management (3). Fundamentals of TQM and its historical development. Integration of QC and management tools, QFD, Benchmarking for scientific management. Prerequisite: Permission of advisor.

EIN 4243 Human Factors Engineering (2). Examination of the ways to fit jobs and objects better to the nature and capacity of the human being. Lectures will review man's performance capability, singly and in groups, in interacting with his work environment. Stresses the practical application of human factors principles. Prerequisite: EIN 4314. Corequisite: EIN 4243L. (F)

EIN 4243L Human Factors in Engineering and Design Laboratory (1). Experiments are conducted which measure human factors indicators and differences by age, sex, and race, as well as physiological and anatomical differences. Corequisite: EIN 4243. (Lab fees assessed). (F)

EIN 4261 Industrial Hygiene (3). A continuation of Safety in Industry. An introduction to OSHA regulations on health hazards. Noise, radiation, and dust problems in industry. Special hazards with solvents, asbestos, lead, silica, and other chemicals. OSHA compliance procedures. Prerequisite: Senior standing. (S)

EIN 4314 Work Design and Industrial Ergonomics (2). The analysis, design, and maintenance of work methods. Study of time standards, including Pre-Determined time standards and statistical work sampling. Prerequisites: EGN 3124, EIN 3235 or equivalent. Corequisite: EIN 4314L. (S)

EIN 4314L Work Design and Industrial Ergonomics Laboratory (1). Experiments in the different Work Design techniques including Performance Sampling, Time Studies, Pre-Determined Time Systems and Workplace Design. Corequisite: EIN 4314. (Lab fees assessed). (S)

EIN 4326 Industrial Research and Development (3). Research and development for new product strategies, technological assessment, patent and product liability, and sales engineering. An independent study product will be required by each student. Prerequisite: Senior status.

EIN 4328 Introduction to Engineering Entrepreneurship (3). Fundamentals of engineering entrepreneurship; entrepreneurial process, identification of opportunities, starting and managing the venture, and development of business plans.

EIN 4333 Productivity Planning (3). The improvement of productivity as a functional activity of the enterprise. Productivity definitions, measurement, methodologies, and reporting systems. Prerequisites: EIN 4314, ESI 3161, and statistics.

EIN 4334 Production Planning and Control (3). Production systems, demand forecasting, capacity planning, master production planning, material requirements planning, shop floor control, and assembly line balancing. Prerequisites: EIN 3354 and ESI 3321. (S)

EIN 4351 Introduction to Industrial Financial Decisions (3). Fundamental concepts of industrial financial decisions, financial planning and analysis tools, justification for industrial capital investments, and intermediate and long-term financing options. Prerequisite: EIN 3354.

EIN 4387 Technology Assessment (3). Development of systematic efforts to anticipate impacts on society that may occur when a technology is introduced, extended, or modified. Prerequisites: Senior standing in Engineering, ESI 3161 and Statistics.

EIN 4389 Technological Forecasting (3). Emphasis on forecasting future trends and specific developments in the area of capabilities and needs. Prerequisites: Senior standing in Engineering and EIN 4334.

EIN 4391 Concurrent Engineering (3). Overview of product and process design. Principles of design for manufacturing. Manufacturability evaluation methods. Computer aided design for manufacturing techniques and strategies. Prerequisites: EIN 3600 and EIN 3390.

EIN 4395 Computer Integrated Manufacturing (3). The integration of computer aided design and computer aided manufacturing. Development of a common data base for design and manufacturing. Developments of flexible manufacturing systems. Prerequisites: EIN 3600 and ESI 3523.

EIN 4440 Introduction to Technology Entrepreneurship (3). An introduction to theories, concepts, and practices of entrepreneurship. Students will produce feasibility analyses, learn to develop and analyze new ventures, and be introduced to business plans.

EIN 4441 Engineering Business Plan Development (3). This course is designed to help students develop an effective implementation plan for a new business venture. Prerequisites: ENT 4113 or EIN 4440.

EIN 4451 Lean Production Systems (3). Design and analysis of lean manufacturing systems, small lot production, setup-time reduction, continuous improvement, six-sigma, push and pull manufacturing, production planning and scheduling. Prerequisites: ESI 3321, EIN 3235.

EIN 4933 Special Topics in Industrial Engineering (2-3). Permits in-depth study in areas relating to specific student interests, recent advances, and problems in industrial technology or systems. Prerequisites: Senior standing, consent of faculty advisor and approval of department chairman.

EIN 4941 Undergraduate Industrial and Systems Engineering Internship (1). To provide undergraduate students with work experience under approved industrial supervision. Prerequisite: Department chairperson's approval.

EIN 4949 Co-op Work Experience (1-3). Practical Co-op work experience under approved industrial supervision. Written report required at the conclusion of the work assignment. Prerequisite: Permission of department chairperson.

EIN 5106 Regulatory Aspects of Engineering (3). A survey of the legal and regulatory requirements encountered by engineers. Included OSH Act, NIOSH, ADA, EEOC, Worker's Compensation and Product Liability. (SS)

EIN 5160 Management of Innovation and Technology (3). The course provides an integrated view of management of technology. The combination of theory and practice addresses the challenges of globalization, time compression, and technology integration. Prerequisite: Permission of instructor.

EIN 5226 Total Quality Management for Engineers (3). Fundamentals of TQM and its historical development. Integration of QC and management tools, QFD, benchmarking, experimental design for scientific management. (F,S)

EIN 5244 Cognitive Engineering (3). Advanced topics in human factors and cognitive engineering. Theoretical aspects of applied situation awareness and decision making, and applications in a variety of engineering domains. Prerequisite: EIN 4243.

EIN 5249 Occupational Biomechanics (3). Study of the theoretical fundamentals for the mechanics of the body. The link system of the body and kinematic aspects of body movement including applications of biomechanics to work systems. Prerequisites: EIN 4314 Work Design and Industrial Ergonomics or equivalent. (S)

EIN 5256 Usability Engineering (3). The usability aspects of software systems design and testing. The theory of interface design for usability and the methods and techniques for designing and testing technology interfaces. Prerequisite: Permission of Instructor.

EIN 5322 Engineering Management (3). Organization of engineering systems including production and service organizations. Inputs of human skills, capital, technology, and managerial activities to produce useful products and services. (F,S)

EIN 5332 Quality Engineering (3). This course examines quality control from an engineering standpoint. It covers ways to meet the challenge of designing high-quality products and processes at low cost. Prerequisites: EIN 3331 or equivalent. (S)

EIN 5346 Logistics Engineering (3). Concepts and tools for effective design and management of supply chain systems. Includes logistics strategies, inventory management, customer service, supply chain integration and logistics network design. Prerequisite: Consent of Instructor.

EIN 5359 Industrial Financial Decisions (3). The use of financial techniques and data in planning, controlling and coordinating industrial activities. This course will familiarize the student with accounting concepts and analytical methods. Prerequisite: EIN 3354. (SS)

EIN 5367 Design of Production Systems (3). The design of an industrial enterprise including feasibility, plant layout, equipment specifications, auxiliary services, economics and scheduling. Prerequisite: EIN 3365.

EIN 5392 Design and Implementation of Discrete Manufacturing Systems (3). Methodology and techniques for design, planning and implementation of discrete production systems including process/machine selections, material handling and inspection technologies, cell control, etc. Prerequisites: Graduate or seniors with EIN 3365, EIN 3390, and ESI 3523 or equivalent.

EIN 5605 Robotic Assembly Cell (3). Concepts of robot manipulation and sensing, part design for robotic assembly, planning manipulator trajectories, machine vision, robot programming language, cell control, and material transfer. Prerequisite: EIN 3600.

ESI 1622 Introduction to Engineering Software Applications (3). Hands-on experience with software packages such as Autocad, MS Word, Excel, PowerPoint, Access, Windows XP, and industrial applications of the Internet. Prerequisite: High school students in dual enrollment programs.

ESI 3161 Software Tools for ISE (3). Basic concepts of microprocessors; an overview of computer architecture, local area networks, micromainframe linking, and operating systems as they apply to industrial systems.

ESI 3321 Operations Research I: Deterministic Models (3). Modeling principles with emphasis on linear programming and extensions. The simplex procedure and its application through computer software packages. The analysis and interpretation of results in decision making. Prerequisites: MAC 2312, permission of the instructor. (F)

ESI 3523 Simulation Models of Industrial Systems (2). Simulation methodology, design of simulation experiments, implementation of simulation effort through computer software. Application to the solution of industrial and service system problems. Prerequisites: CGS 2423 or equivalent, ESI 3161, ESI 3321 and EIN 3235 or equivalent. Corequisite: ESI 3523L. (S)

ESI 3523L Simulation Models of Industrial System Laboratory (1). Simulation Modeling on a microcomputer. Analyze and validate design models using both a general purpose programming language and a special-purpose simulation language. Corequisite: ESI 3523. (S)

ESI 4244 Evaluation of Engineering Data II (3). Application of statistical analysis in engineering practice, design of engineering experiments, and decision making. Study of prediction, tolerance intervals. Use of computer tools. Prerequisites: EIN 3235 or equivalent.

ESI 4317 Computer Algorithms for Operations Research (3). Discussion and implementation of a collection of computer algorithms essential for the O.R. researcher and consultant. This collection of algorithms includes both deterministic and stochastic models. Computer exercises. Prerequisites: ESI 3321 or equivalent. (S)

ESI 4322 Operations Research II: Stochastic Models (3). Modeling principles with emphasis on applications of Markov Chains, queuing models, systems reliability, Bayesian decision analysis. Prerequisites: ESI 3321, EIN 3235 or equivalent. (S)

ESI 4452 Project Management Systems Design (3). Project planning, scheduling and control using activity network logic. System development techniques and strategies. Prerequisite: Permission of the instructor. (F)

ESI 4554 ISE Systems Design (3). To integrate all prior ISE required courses into a cohesive and consistent professional philosophy. Prerequisite: Permission of instructor. (S)

ESI 4556 Industrial and Systems Engineering in the Office (3). Paperwork reduction, overhead and expense cost containment, and white collar productivity through office automation and systems analysis.

ESI 5522 Simulation Models of Engineering Systems (3). Simulation Methodology; design and implementation of models of engineering systems using computer software; case studies. Prerequisites: STA 3033 or EIN 3235 or equivalent and COP 3175 or equivalent.

ESI 5456 Productivity Management in the Global Organization (3). Analysis of productivity management strategies. Major issues in performance and productivity management, domestic and global outsourcing, international labor standards and trade policies. Prerequisites: EIN 4214 or equivalent.

ESI 5602 Engineering Data Representation and Modeling (3). The course will cover the life cycle of designing, developing, and implementing engineering database systems by applying the IDEFLx methodology. Prerequisite: Permission of Instructor.

ESI 5603 Advanced Software Tools for ISE (3). Algorithms and principles to integrate heterogeneous tools. Principles of XML, ASP, and other tools. Development of programming projects.