I E-INDUSTRIAL ENGINEERING

I E 151. Computational Methods in Industrial Engineering
3 Credits (3)
History, social implications, and application of computers and an introduction to computer programming, word processing, and database management systems. Satisfies General Education computer science requirement.
Prerequisite: MATH 1220G.

I E 200. Special Problems-Sophomore
1-3 Credits
Directed individual projects. May be repeated for a total of 3 credits.
Prerequisite: consent of faculty member.

I E 217. Manufacturing Processes
2 Credits (2)
Manufacturing methods and industrial processes which include casting, forming and machining. May be repeated up to 2 credits. Crosslisted with: E T 217, E T 110.
Prerequisite(s): MATH 1220G.

I E 217 L. Manufacturing Processes Laboratory
1 Credit (3P)
Laboratory associated with I E 217. May be repeated up to 1 credits.
Prerequisite(s): I E 217.
Corequisite(s): I E 217.

I E 300. Special Problems-Junior
1-3 Credits
Directed individual projects. May be repeated for a total of 3 credits.
Prerequisite: consent of faculty member.

I E 311. Engineering Data Analysis
3 Credits (3)
Methodology and techniques associated with identifying and analyzing industrial data. May be repeated up to 3 credits.
Prerequisite(s): C- or better in MATH 1521G or MATH 1521H; C- or better in I E 151, BCIS 1110, or equivalent.

I E 316. Methods Engineering
3 Credits (2+3P)
Methods analysis and design. Work measurement techniques. Job evaluation and wage incentive methods. May be repeated up to 3 credits.
Prerequisite(s): I E 217, I E 311, E T 110.

I E 351. Applied Problem Solving in Industrial Engineering
3 Credits (3)
Application of computational techniques to engineering problems including the use of commercial programs in statistics and applied mathematics. Restricted to majors.
Corequisite(s): I E 311.

I E 365. Quality Control
3 Credits (3)
Statistical analysis of quality in manufacturing. Acceptance sampling and control charts.
Prerequisite: I E 311 or equivalent.

I E 375. Manufacturing Processes II
3 Credits (3)
Review of basic manufacturing processes. Advanced topics in casting, forming, machining and joining; major process parameters; economics of processes.
Prerequisite: I E 217 or E T 217.

I E 381. Technology Ventures
3 Credits (3)
This course looks at how new technology ventures are formed at the individual entrepreneur and corporate levels. It covers the development of science and engineering based ventures from ideas through creating customer value. This is the first course in the Entrepreneurship Minor. The roles of science and engineering specialists in the creation of customer value are defined in preparation for development of technology-based enterprises.

I E 382. Business for the Practicing Engineer
3 Credits (3)
Business tools and skills, including technology commercialization, patent applications, preparing a technology-oriented business plan, reading and constructing financial documents, modeling and understanding markets, e-commerce, QFD, concurrent engineering, engineer’s role in the global economy, and engineer’s impact on product design and cost.
Prerequisite: engineering major, junior level or above.

I E 400. Undergraduate Research
1-3 Credits
May be repeated for a maximum of 6 credits.
Prerequisite: consent of faculty member.

I E 411. Occupational Safety
3 Credits (3)
Practical methods to improve safety in the workplace. Topics include OSHA and other regulations, hazard recognition, assessment and control, industry standards, risk assessment and safety management. Material is applicable to a variety of workplace settings. This course is intended for College of Engineering students who have completed their lower-division requirements in mathematics, engineering, technology, and basic science. Same as I E 561 with differential assignments. Prerequisite: Junior standing

I E 413. Engineering Operations Research I
3 Credits (3)
Deterministic operations research modeling including linear and integer programming. May be repeated up to 3 credits.
Prerequisite(s): MATH 1521G or MATH 1521H.
Corequisite(s): MATH 480.

I E 423. Engineering Operations Research II
3 Credits (3)
Probabilistic operations research modeling, including queuing systems and their optimization; Markov chains. May be repeated up to 3 credits.
Prerequisite(s): I E 311.
Corequisite(s): MATH 392.

I E 424. Manufacturing Systems
3 Credits (3)
Organization and functions of manufacturing planning and control systems including forecasting, MRP, capacity planning, JIT systems, scheduling, and inventory control.
Prerequisite: I E 311.

I E 451. Engineering Economy
3 Credits (3)
Discounted cash flows, economics of project, contract and specifications as related to engineering design.
I E 453. Leadership and Motivation
3 Credits (3)
Theories of leadership and motivation. Motivational programs for complex organizations. Relationships between organizational power, authority, and management styles. Same as MGMT 453.
Prerequisite: MGMT 309 or consent of instructor.

I E 460. Evaluation of Engineering Data
3 Credits (3)
Analysis of engineering systems possessing variability, employing regression, analysis of variance, distribution theory, and experimental design methods.
Prerequisite: I E 311 or equivalent.

I E 466. Reliability
3 Credits (3)
Application of statistical theory to engineering reliability estimation, reliability improvement, and the analysis of reliability test data.
Prerequisite: I E 311 or equivalent.

I E 467. Discrete-Event Simulation Modeling
3 Credits (3)
Basic modeling concepts, organizations of simulations, input data analysis, random variate generation, simulation design and analysis, model validation, output analysis, and management of simulations. Differentiated graduate assignments. May be repeated up to 3 credits.
Prerequisite(s): I E 311 or equivalent.

I E 478. Facilities Planning and Design
3 Credits (3)
Plant location methods, total process analysis, process integration, materials handling analysis, and traditional and computerized plant layout methodologies.
Prerequisite(s): I E 316.
Prerequisite(s)/Corequisite(s): I E 424.

I E 480. Senior Design
3 Credits (2+3P)
Multi-disciplinary team design project for external clients. Involves semester long activities including major design report and presentation. Prerequisites: senior standing, I E 467.

I E 490. Selected Topics
1-3 Credits
May be repeated for a maximum of 9 credits.
Prerequisite: consent of the head of the department.

I E 505. Directed Readings
1-3 Credits
May be repeated for a maximum total of 6 credits.
Prerequisite: consent of the head of the department.

I E 515. Stochastic Processes Modeling
3 Credits (3)
Introduction to the use of stochastic processes in the modeling of physical and natural systems. Use of generating functions, conditional probability and expectation, Poisson processes, random walk models, Markov chains, branching processes, Markov processes, and queuing processes in an applied setting.
Prerequisites: I E 311 or equivalent; and MATH 392 or equivalent.

I E 522. Queuing Systems
3 Credits (3)
Elements and classification of queuing systems, single server models, multi-server models, cost analysis and applications.
Prerequisite: I E 311 or equivalent.

I E 523. Advanced Engineering Economy
3 Credits (3)
Theoretical basis for engineering economy methods, problems of cost estimation, replacement, nonmonetary factors, and feasibility studies. Same as C E 523.

I E 524. Advanced Production and Inventory Control
3 Credits (3)
Organization and functions of manufacturing planning and control systems including forecasting, MRP capacity planning, JIT systems, scheduling and inventory control. Same as I E 424 with differentiated assignments.

I E 525. Systems Synthesis and Design
3 Credits (3)
Examination of the production management complex in terms of its components and the synthesis of these components into an effective operating unit. Development of input-output models representing the basis structure of all production activities.

I E 530. Environmental Management Seminar
1 Credit (1)
Survey of practical and new developments in hazardous and radioactive waste management provided through a series of guest lectures and reports of ongoing research. Same as C E 530, E E 530, CHME 530.

I E 533. Linear Programming
3 Credits (3)
Linear programming problem formulation, simplex algorithm, theory of linear programming, duality, revised simplex algorithm, and sensitivity analysis.

I E 534. Nonlinear Programming
3 Credits (3)
Theoretical and computational methods to solve optimization problems in engineering, statistics, economics, and operations research. Topics include convexity, optimality conditions, Newton's method, Lagrange multipliers, search algorithms for unconstrained and constrained problems, as well as barrier and penalty methods. Prerequisite: MATH 1521G or MATH 1521H or equivalent.

I E 535. Discrete Optimization
3 Credits (3)
Combinatorial Optimization problems using both integer programming and graph theoretic approaches. Emphasis on modeling and computational algorithms.

I E 537. Large Scale Systems Engineering
3 Credits (3)
Systems engineering approaches to large-scale complex technological and societal problems. Concepts of interaction and structural graphs, matrices, delta, and Gantt charts. The hall matrix approach, structural concepts, reachability matrices, and cross impact-analysis, modeling and decision making.

I E 545. Characterizing Time-Dependent Engineering Data
3 Credits (3)
Theory and techniques employed in the characterization of stochastic processes commonly found in engineering applications. Distribution models include exponential, gamma, Weibull, and extreme value. Design and analysis of experiments involving complete and censored data and elevated stress. Analytical techniques include parametric, nonparametric, and graphical approaches with emphasis on modern computer tools. Exact and approximate maximum-likelihood techniques are stressed. Prerequisite: I E 311 or equivalent.
IE 561. Advanced Safety Engineering  
3 Credits (3)  
Regulation as well as qualitative, and quantitative methods to achieve and maintain safety in the workplace. Includes liability, worker’s compensation, OSHA, hazard control, safety assessment, cost justification, and system analysis.  
Prerequisite: graduate status in engineering.

IE 563. Topics in Engineering Administration  
3 Credits (3)  
Study of qualitative and quantitative aspects. Consideration given to philosophical, psychological, political and social implications of engineering administrative decisions.

IE 567. Design and Implementation of Discrete-Event Simulation  
3 Credits (3)  
Basic modeling concepts, organizations of simulations, input data analysis, random variate generation, simulation design and analysis, model validation, output analysis, and management of simulations. Taught with IE 467 with differentiated assignments for graduate students.

IE 571. Advanced Quality Control  
3 Credits (3)  
Advanced topics in quality control and design of experiments for improvement of quality.  
Prerequisite: IE 311 or equivalent.

IE 575. Advanced Manufacturing Processes  
3 Credits (3)  
Covers major process parameters in casting, forming, machining, and joining. Process economics and selection of processes design and interactions.  
Prerequisite: graduate standing.

IE 590. Selected Topics  
1-3 Credits  
May be repeated for a maximum of 9 credits.  
Prerequisite: consent of the head of the department.

IE 598. Special Research Programs  
1-3 Credits  
Individual analytical or experimental investigations. May be repeated for a maximum total of 6 credits.  
Prerequisite: consent of instructor.

IE 599. Master’s Thesis  
1-15 Credits  
Thesis.

IE 610. Topics in Operations Research  
3 Credits (3)  
Selected topics of current interest, to be designated by subtitle. May be repeated for a maximum of 6 credits.

IE 620. Topics in Computer Modeling  
3 Credits (3)  
Selected topics of current interest, to be designated by subtitle. May be repeated for a maximum of 6 credits.

IE 630. Topics in Engineering Management  
3 Credits (3)  
Selected topics of current interest, to be designated by subtitle. May be repeated for a maximum of 6 credits.

IE 690. Selected Topics  
1-15 Credits  
May be repeated.  
Prerequisite: consent of department head.

IE 700. Doctoral Dissertation  
15 Credits  
Dissertation.