

INDUSTRIAL AND SYSTEMS ENGINEERING (ISE)

Industrial and Systems Engineering (ISE) Courses

ISE 3513. Inferential Statistics for Industrial Engineers. (3-0) 3 Credit Hours.

Prerequisite: STA 2303. Statistical concepts and methods with practical applications to industrial engineering problems. Topics include descriptive and inferential statistics, simple and multiple linear regression models, hypothesis testing, analysis of variance (ANOVA), and fundamentals of design of experiments. Generally offered: Fall. This course has Differential Tuition. Course Fee: DL01 \$75.

ISE 3653. Operations Research I. (3-0) 3 Credit Hours.

Prerequisite: EGR 2302, and STA 2303 or ME 3113. Introduction to fundamental optimization models and solution methods, including linear programs, the simplex method, duality theory, sensitivity analysis, integer programs, and network flows. Focus on formulating and solving practical operations research problems and the use of optimization software. (Same as ME 3273. Credit cannot be earned for both ME 3273 and ISE 3653.) Generally offered: Fall. This course has Differential Tuition.

ISE 4263. Supply Chain Engineering. (3-0) 3 Credit Hours.

Prerequisite: ISE 3653 or equivalent. This course focuses on the engineering design and the use of operations research to make optimal supply chain decisions. Students will learn essential concepts and solution methods to address supply chain problems related to design, control, operations, and management with applications in facility location, capacity determination, logistics, contract management, inventory control, and sustainability. Generally offered: Fall. This course has Differential Tuition.

ISE 4273. Systems Modeling and Simulation. (3-0) 3 Credit Hours.

Prerequisite: ME 3173, and ME 3113 or ISE 3513, or equivalents. Systems analysis approach to formulating and solving engineering problems. Topics include mathematical modeling, discrete event simulation, and decision analysis. Focus on applying systems modeling methods on practical industrial problems and the use of simulation software. (Formerly ME 4273 and ISE 4213. Credit cannot be earned for both ISE 4213 and ME 4273 and ISE 4273.) Generally offered: Spring. This course has Differential Tuition.

ISE 4363. Data Analytics in Industrial Systems. (3-0) 3 Credit Hours.

Prerequisite: ISE 3653 or equivalent. Introduction to discovery and communication of meaningful patterns in data with emphasis on industrial systems. Topics include data description (descriptive/ visualization techniques), prediction (predictive modeling using machine learning), improve performance (optimization/decision making). Generally offered: Fall. This course has Differential Tuition.

ISE 4373. Cyber-informed Engineering. (3-0) 3 Credit Hours.

Prerequisite: ME 3173. Introduction to cyber-informed engineering principles, integrating cybersecurity considerations into the design, operation, and protection of industrial and critical infrastructure systems. Topics include cyber-physical system vulnerabilities, attack surfaces, resilience engineering, and regulatory frameworks. Through case studies and hands-on exercises, students will develop a foundational understanding of how to incorporate cybersecurity into engineering decision-making and system design. This course has Differential Tuition.

ISE 4503. Lean Manufacturing and Enterprise Engineering. (3-0) 3 Credit Hours.

Prerequisite: ME 3263 or equivalent. Concepts and applications of Lean Systems applied to manufacturing and non-manufacturing environments. Topics include lean fundamentals and various tools and methodologies for transformation of companies and organizations into globally competitive enterprises. Team project on Value Streaming Mapping analysis of processes in real settings is required. (Same as ME 4503. Credit cannot be earned for both ME 4503 and ISE 4503.) Generally offered: Spring. This course has Differential Tuition.

ISE 4563. Computer Integrated Manufacturing. (3-0) 3 Credit Hours.

Prerequisite: ME 3263, or equivalent. Fundamental concepts and models related to computer-aided design, computer-aided process planning, computer-aided manufacturing, production planning and scheduling, and manufacturing execution systems, with practices on computer-aided applications and programming of automated production equipment. (Formerly ME 4563. Credit cannot be earned for both ME 4563 and ISE 4563.) Generally offered: Spring. This course has Differential Tuition.

ISE 4573. Facilities Planning and Design. (3-0) 3 Credit Hours.

Prerequisite: ME 3263 or equivalent. Product, process, and schedule design, flow, space, and activity relationships, material handling, layout planning models and design algorithms, and warehouse operations. (Same as ME 4573. Credit cannot be earned for both ME 4573 and ISE 4573.) Generally offered: Spring. This course has Differential Tuition.

ISE 4583. Quality Engineering and Six Sigma. (3-0) 3 Credit Hours.

Prerequisite: ME 3263 or equivalent. Fundamental concepts, methodologies, and tools for the design, engineering and continuous improvement of enterprise operations. Topics include cost of poor quality, process capability, statistical quality control, Six Sigma for process design and improvement, and other contemporary process engineering approaches. (Same as ME 4583. Credit cannot be earned for both ME 4583 and ISE 4583. Formerly titled: "Enterprise Process Engineering.") Generally offered: Spring. This course has Differential Tuition. Course Fee: DL01 \$75.

ISE 4653. Operations Research II. (3-0) 3 Credit Hours.

Prerequisite: ISE 3653 or equivalent. Introduction to advanced deterministic and stochastic modeling. Topics include Poisson processes, discrete and continuous-time Markov Chains, Dynamic Programming, and Queuing theory. Students will learn model formulation, solution strategies, and real-world applications in manufacturing and service systems. Applications include production planning, inventory control, scheduling, and revenue management. Generally offered: Fall. This course has Differential Tuition.

ISE 4713. Human Factors Engineering and Ergonomics. (3-0) 3 Credit Hours.

Prerequisite: ISE 3653 or equivalent. Fundamentals of human factors and ergonomics theory and methods, with emphasis on workplace and human-machine systems design. Topics include human body and sensing, posture, handling, and ergonomic design principles and cases. Generally offered: Spring. This course has Differential Tuition.

ISE 4723. Reliability in Engineering Design. (3-0) 3 Credit Hours.

Prerequisite: ME 3113 or ISE 3513. Introduction to statistical methods in reliability and probabilistic engineering design methodology, statistical quality control and inspection, life prediction and testing, and design optimization (Formerly ME 4723. Credit cannot be earned for both ME 4723 and ISE 4723.) This course has Differential Tuition.

ISE 4763. Integrated Production Systems. (3-0) 3 Credit Hours.

Prerequisite: ISE 3653, ISE 4503, and ISE 4583, or equivalents. Design, planning, scheduling, and control of production systems with emphasis on systems thinking, modeling, and decision-making. Topics include inventory planning, production control, queueing models, and lean systems. Generally offered: Spring. This course has Differential Tuition.

ISE 4813. Senior Design I. (3-0) 3 Credit Hours.

Prerequisite: ISE 3653, ISE 4503, ISE 4583, and ISE 4713, or equivalents. Industrial engineering design project proposals, problem identification, systems modeling, analysis, and evaluation of opportunities for system improvement; presentation of conceptual designs. Industrial cooperation is encouraged. (Same as ME 4812. Formerly ME 4803, ME 4811, and ISE 4812. Credit can only be earned for one of the following: ME 4812, ME 4803, ME 4811, ISE 4812, and ISE 4813.) Generally offered: Fall. This course has Differential Tuition.

ISE 4823. Senior Design II. (3-0) 3 Credit Hours.

Prerequisite: EGR 3713, ISE 4713, ME 4801, and ISE 4812, or equivalents. Validation and implementation of solutions of an instructor-approved industrial engineering design project using computer-aided synthesis, analysis, modeling, optimization methods, and systems thinking. Industrial cooperation encouraged. Considerations of safety, reliability, environmental, and economic constraints, and ethical and social impacts. (Same as ME 4813. Credit cannot be earned for both ME 4813 and ISE 4823.) Generally offered: Spring. This course has Differential Tuition.

ISE 4911. Independent Study. (0-0) 1 Credit Hour.

Prerequisite: Permission in writing (form available) from the instructor, the Department Chair, and the Dean of the College. Independent reading, research, discussion, and/or writing under the direction of a faculty member. May be repeated for credit, but not more than 6 semester credit hours of independent study, regardless of discipline, will apply to a bachelor's degree. This course has Differential Tuition.

ISE 4913. Independent Study. (0-0) 3 Credit Hours.

Prerequisite: Permission in writing (form available) from the instructor, the Department Chair, and the Dean of the College. Independent reading, research, discussion, and/or writing under the direction of a faculty member. May be repeated for credit, but not more than 6 semester credit hours of independent study, regardless of discipline, will apply to a bachelor's degree. This course has Differential Tuition.

ISE 4953. Special Studies in Industrial and Systems Engineering. (3-0) 3 Credit Hours.

Prerequisite: Will depend on the topic and must be identified before the course is scheduled; the minimum prerequisite must be ME 3173, or a higher-level engineering course depending on the topic. An organized course offering the opportunity for specialized study not normally or not often available as part of the regular course offerings. Special Studies may be repeated for credit when topics vary, but not more than 6 semester credit hours, regardless of discipline, will apply to a bachelor's degree. Generally offered: Fall, Spring. This course has Differential Tuition.