# Industrial Engineering Courses

**IE 305 - Facilities Planning & Management**
Hours: 3
Study of production facilities, including location, planning design and management. Emphasis on production systems, machine selection, facility location-allocation, material handling, and storage and warehousing. Prerequisites: IE 312 with a minimum grade of C.

**IE 311 - Advanced Engineering Statistics**
Hours: 3
This course emphasizes the application of statistical tools to real-world problems. You will learn how to process, analyze and visualize large data sets. The topics include hypothesis tests, simple and multiple linear regression, basic of machine learning via python, and design of experiment. Prerequisites: ENGR 213 with a minimum grade of C.

**IE 312 - Industrial Operations Research**
Hours: 3
This course focuses on the application of linear programming techniques. Most of the mathematical models presented in the course are normal prescriptive or optimization applications. The course includes discussions of the Simplex method, sensitivity analysis, duality and post optimal analysis. Prerequisites: MATH 2318 with a minimum grade of C.

**IE 313 - Industrial Operations Research II**
Hours: 3
This course focuses on the application of linear programming techniques. The models included in this course are Transportation, Assignment and Transshipment. The network models (Shortest Path; Maximum-Flow; and Minimum-Cost) are included. The course includes formulating integer programming problems. Prerequisites: IE 312 with a minimum grade of C.

**IE 314 - Statistical Quality Control**
Hours: 3
A comprehensive coverage of modern quality control techniques to include the design of statistical process control systems, six sigma, lean six sigma, and process improvement. Prerequisites: IE 311 with a minimum grade of C.

**IE 316 - Manufacturing Systems Design and Control**
Hours: 3
Advanced course emphasizing the analysis and design of job requirements, workplace arrangements, material handling devices/systems and machine controls which improve the human workplace. Students will research and create a system design project. Prerequisites: IE 311 and MATH 2413.

**IE 318 - Analysis of Production Systems**
Hours: 3
Analytical principles of production systems analysis and control; emphasis placed on demand forecasting; push versus pull production strategies; inventory models; and production planning and scheduling. Prerequisites: IE 311 with a minimum grade of C, IE 312 with a minimum grade of C.

**IE 397 - Special Topics**
Hours: 3
Special Topics. Three semester hours. Organized class. May be repeated when topic varies.

**IE 403 - Human Factors Engineering**
Hours: 3
The emphasis of this course is the design of the human-system interface. The principles of body mechanics, work safety, and anthropometry are applied to the human-system design for reduction of human errors and injuries. Prerequisites: ENGR 213 Min Grade C.

**IE 407 - Production Systems Operations**
Hours: 3
Analytical principles of manufacturing systems design, analysis and control; emphasis placed on stochastic analysis; role of variability and impact on cycle time; push versus pull production strategies including Kanban and constant WIP control; probability, queueing theory, Little's Law, heavy traffic approximation and queueing networks. Prerequisites: IE 316.

**IE 409 - Work Design**
Hours: 3
Advanced course emphasizing the analysis and design of job requirements, workplace arrangements, human-machine system design processes and principles which improve the human workplace. Students will create a system design project. Prerequisites: IE 318 with a minimum grade of C.

**IE 410 - Systems Simulation**
Hours: 3
The application of simulation to facilities layout for manufacturing industries, service business models, entertainment and crisis management is emphasized. Areas covered include concepts of discrete event simulation, data collection, simulation modeling, and analysis of simulation outputs. Prerequisites: IE 311 with a minimum grade of C.

**IE 431 - Manufacturing Support Systems**
Hours: 3
Concepts and principles of automation and automation control, including sensors, actuators, process variable conversion, programmable logic controllers (PLCs), logic controllers, microcontrollers, industrial robotics, NC technology, and flexible manufacturing systems. Prerequisites: Phys. 2426 with a minimum of C.

**IE 444 - Systems Engineering**
Hours: 3
A study of the systems acquisition life cycle, life cycle cost (LCC) analyses, design for reliability, trade off analyses, design for manufacturability, design for manageability. Prerequisites: Senior classification in Industrial Engineering and instructor's consent.

**IE 471 - Planning for Industrial System Design**
Hours: 3
This course is a precursor for IE 495. Each student will enroll the following spring in IE 495 and as member of a student team. The objective of the course is for each team to prepare a proposal (technical and management sections) to outline the approach and methodology that the team plans to follow in working with industry sponsors on real-world industrial engineering process improvement activities. The proposed improvement activity will be the systems design project planned for the following spring semester in IE 495 Industrial Systems Design. The proposal prepared during this class is intended to present: the background for the problem, statement and description of the problem, the approach, the methodology and analytical support of the team's plans for the execution of the project. Prerequisites: IE 313 with a minimum grade of C, Senior Classification, IE Majors only, Course must be scheduled in the fall semester prior to the student's IE 495 enrollment in the final spring semester and Instructor's consent.

**IE 486 - Service Systems Analysis**
Hours: 3
This course focuses on analyses and visualization of engineering issues faced by service industries contrasted against production and manufacturing industries, service business models, development of facility location, technological tools used in serving various business, and metrics to measure quality of services. IE Major. Course scheduled in the final semester of the student's IE Program. Prerequisites: Senior Classification. Corequisites: IE 495.

**IE 489 - Independent Study**
Hours: 1-3
Independent Study. One to Three semester hours Individualized instruction/research at an advanced level in a specialized content area under the direction of a faculty member. May be repeated when the topic varies.

**IE 490 - H HONORS THESIS**
Hours: 1-6

**IE 491 - Honors Reading**
Hours: 3

**IE 495 - Industrial Systems Design**
Hours: 3
This course is the Industrial Engineering Capstone Design course, covering: flexible manufacturing systems and manufacturing integration; integrated knowledge to be gained from using all required industrial engineering courses in a system design project. Students are able to work with industry sponsors on real-world industrial engineering process improvement activities. Prerequisites: IE 471 with a minimum grade of C; Senior classification in Industrial Engineering and instructor's consent. Corequisites: IE 486.

**IE 497 - Special Topics**
Hours: 3
Special Topics. Three semester hours. Organized class. May be repeated when topic varies.