

# INDUSTRIAL ENGINEERING (IE-GY)

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## IE-GY 930 Readings in Industrial Engineering I (3 Credits)

In this course, students individually read selected papers and current literature in specialized area and are guided by a faculty member. | Prerequisite: Approval of adviser, instructor and department head.

**Grading:** Grad Poly Graded

**Repeatable for additional credit:** Yes

## IE-GY 6003 Engineering Economics (3 Credits)

*Typically offered occasionally*

Engineers are responsible for the design, development, deployment of products and projects and should evaluate alternatives when available. Solutions run from the simple where the decisions are made quickly to detailed analysis of complex alternatives. Student will learn the necessary accounting terms, financial concepts, costing, investment analysis, time-value of money, equipment, and how material specifications are used in the investment decisions processes. Upon completion of the course, students will be able to quantify the alternatives used as part of the decision process in recommending what course of action to be taken. The most economical choice may not be the recommended alternative based on other considerations i.e. political, past experience with suppliers, equipment standardization.

**Grading:** Grad Poly Graded

**Repeatable for additional credit:** No

## IE-GY 6063 Work Design and Measurement (3 Credits)

*Typically offered occasionally*

Principles and techniques of designing work methods and work simplification programs. Theory and techniques of workplace design, work measurement, time study, work sampling, standard data systems, methods analysis, rating, and work allowances. Applications of ergonomics and anthropometrics to promote worker health and safety in lean manufacturing environments.

**Grading:** Grad Poly Graded

**Repeatable for additional credit:** No

## IE-GY 6113 Quality Control and Improvement (3 Credits)

*Typically offered occasionally*

This course provides students with a solid foundation in the cost of quality, quality assurance and quality management. Emphasis is on the basic tools of quality control such as control charts and their use, the concept of "out of control," acceptance sampling, variables and attributes charts and producer's and consumer's risk. A unique aspect of this course is the demonstration of the power of teams of people with different expertise to improve quality. A course project is required. | Prerequisite: MA-GY 6513 or familiarity with the concepts of probability and statistics. Also listed under MN-GY 6113.

**Grading:** Grad Poly Graded

**Repeatable for additional credit:** No

## IE-GY 6123 Quality Engineering Using Robust Design (3 Credits)

This course provides a broad review of procedures to improve manufacturing quality. By employing both Taguchi techniques, such as the use of signal-to-noise ratio representations and other techniques less sensitive to parameter interactions, a full spectrum of robust design methods are presented. Applications of these procedures are reviewed, including online trouble-shooting methods to assure manufacturing quality. | Prerequisite: IE-GY 6113. Also listed under MN-GY 6123.

**Grading:** Grad Poly Graded

**Repeatable for additional credit:** No

## IE-GY 6163 Job and Workplace Design (3 Credits)

This course examines theory, research and applications of job and workplace design. Job design is presented from an interdisciplinary perspective, focusing on how job design influences attitudes and work behavior within organizations. Students are exposed to diagnostic tools for measuring and evaluating jobs and the psycho-social aspects of the workplace environment, as well as the principles of work redesign. Topics include influences on work design by innovations in information technology, modern manufacturing, virtual work arrangements and open office systems; design and support of effective work teams; re-engineering and total quality management; and privacy and communication in the workplace. | \*An online version is available.

**Grading:** Grad Poly Graded

**Repeatable for additional credit:** No

## IE-GY 6193 Production Planning and Control (3 Credits)

*Typically offered occasionally*

This is a survey course in basic and advanced manufacturing planning and control systems, covering short-term forecasting systems, master production scheduling, material requirements planning, inventory management, capacity management, production activity control and just-in-time.

**Grading:** Grad Poly Graded

**Repeatable for additional credit:** No

## IE-GY 6203 Project Planning and Control (Project Management) (3 Credits)

*Typically offered occasionally*

This course discusses the knowledge and process required to manage a project through its life cycle, from concept to completion. Topics include engineering analysis, screening and selection, configuration and total quality management, scheduling using Program Evaluation and Review Technique (PERT) and Critical Path Method (CPM), budgeting and resource management, computer support and software. Case studies are used to illustrate the process.

**Grading:** Grad Poly Graded

**Repeatable for additional credit:** No

## IE-GY 6213 Facility Planning and Design (3 Credits)

*Typically offered occasionally*

Topics in this course include facilities design for global competitiveness, strategic master-site planning, site selection, factory layout and design, facility-management systems and materials handling and storage planning. Also presented are guidance on selecting alternative facility plans and application of queuing methods and computer modeling for facility design and evaluation.

**Grading:** Grad Poly Graded

**Repeatable for additional credit:** No

## IE-GY 6453 PRODUCTIVITY MANAGEMENT (3 Credits)

This course examines modern approaches to productivity measurement, evaluation, planning and improvement in both manufacturing and service industries. Participants develop productivity models for various types of organizations.

**Grading:** Grad Poly Graded

**Repeatable for additional credit:** No

## IE-GY 6823 Factory Simulation (3 Credits)

*Typically offered occasionally*

This course examines modeling and simulation of complex industrial, commercial and service systems, such as factories and hospitals. Students develop, run and test several simulation models using different software packages. | Prerequisite: Computer literacy.

**Grading:** Grad Poly Graded

**Repeatable for additional credit:** No

**IE-GY 7113 ENGINEERING PRACTICES IN THE BUSINESS ENVIRONMENT 1 (3 Credits)**

This course immerses the student into actual engineering problems in operating businesses. It emphasizes experiential, hands-on learning that includes project planning and management, and application of industrial engineering and manufacturing engineering techniques to real world problems with real world constraints. The student experiences, first hand, the actual practice of engineering and applies the engineering education to solution of industrial operations. For the project, students work in a client company under the academic supervision of a faculty member. Course will focus on applying theory and academic knowledge to analysis and improvement of processes, products and operations. Students will also experience the demands of meeting deadlines and providing cost-benefit solutions in the practice of engineering.

**Grading:** Grad Poly Graded

**Repeatable for additional credit:** No

**IE-GY 7213 ENGINEERING PRACTICES IN THE BUSINESS ENVIRONMENT 2 (3 Credits)**

This course immerses the student into actual engineering problems in operating businesses. It emphasizes experiential, hands-on learning that includes project planning and management, and application of industrial engineering and manufacturing engineering techniques to real world problems with real world constraints. The student experiences, first hand, the actual practice of engineering and applies the engineering education to solution of industrial operations. For the project, students work in a client company under the academic supervision of a faculty member. Course will focus on applying theory and academic knowledge to analysis and improvement of processes, products and operations. Students will also experience the demands of meeting deadlines and providing cost-benefit solutions in the practice of engineering. | Prerequisite: IE-GY 7113, Required courses in major or permission from Program Director

**Grading:** Grad Poly Graded

**Repeatable for additional credit:** No

**IE-GY 7653 Human Factors in Engineering Design (3 Credits)**

*Typically offered occasionally*

Human Factors is a body of knowledge about human abilities, human limitations, and other human characteristics that are relevant to design. Human factors engineering is the application of human factors information to the design of tools, machines, systems, tasks, jobs, and environments for safe, comfortable, and effective human use.

**Grading:** Grad Poly Graded

**Repeatable for additional credit:** No

**IE-GY 7763 Manufacturing Resources Planni (3 Credits)**

*Typically offered occasionally*

This course studies computerized systems to effectively run a manufacturing business. Also covered is the process of software specification, evaluation, selection and implementation. Topics include Manufacturing Resources Planning (MRP) logic, enterprise resource planning, manufacturing execution systems, inventory management and bill of materials. Several software systems and their features are highlighted. Also listed under MN-GY 7763.

**Grading:** Grad Poly Graded

**Repeatable for additional credit:** No

**IE-GY 7853 COMPUTER INTEGRATED MANUFACTURING SYSTEMS (CIMS) (3 Credits)**

This course examines the basic concepts of manufacturing complex products with complex processes. It relies heavily on computer and data processing technologies, which are introduced. Also a variety of perspectives are addressed from all aspects relative to products and processes-planning, design, manufacturing and shipping. Students explore techniques for managing and optimizing manufacturing productivity. Also listed under MN-GY 7853.

**Grading:** Grad Poly Graded

**Repeatable for additional credit:** No

**IE-GY 7873 LEAN MANUFACTURING (3 Credits)**

*Typically offered occasionally*

This course provides an overview to the basic principles, and theories of lean manufacturing which involves identifying and eliminating non-value-adding activities in design, production, and supply chain management. Students will learn an integrated approach to efficient manufacturing with emphasis on synchronized product, quick changeover, cell design, visual factory, value stream, one-piece flow and learn metrics.

**Grading:** Grad Poly Graded

**Repeatable for additional credit:** No

**IE-GY 7883 Manufacturing Systems Engineering (3 Credits)**

Topics in this course concentrate on contemporary techniques for product design and manufacture, including financials of the manufacturing firm, quality, reliability, Taguchi methods of product and process design, scale-up and partitioning, production flows, modern manufacturing methods such as JIT/TQC, pull and synchronized manufacturing. Cultural factors are also discussed. Also listed under MN-GY 7883.

**Grading:** Grad Poly Graded

**Repeatable for additional credit:** No

**IE-GY 7923 Design for Manufacturability (3 Credits)**

*Typically offered occasionally*

This course introduces concepts and techniques for economical, functionally sound and high-quality product design for manufacture. Emphasis is on designing for easy assembly, manually and with robotics and on the effective use of plastics to reduce manufacturing costs. Managerial and organizational approaches and case studies of successful designs are reviewed. | Also listed under MN-GY 7923.

**Grading:** Grad Poly Graded

**Repeatable for additional credit:** No

**IE-GY 7933 Environmental Health and Safety (3 Credits)**

*Typically offered occasionally*

This course presents an overview of environmental, health and safety management, and introduces students to management systems within a manufacturing operation. The course explores motivations and strategies for environmental, health and safety management. Students learn about the mandatory standards understanding the technical and legal rationale for insuring that workers are provided with a safe and healthy workplace. These skills are needed to work effectively in operations, human resources and employee development as well as in industrial relations, since the law provides workers specific safety and health rights. | Also listed under MN-GY 7933.

**Grading:** Grad Poly Graded

**Repeatable for additional credit:** No

**IE-GY 7993 SUPPLY CHAIN ENGINEERING (3 Credits)**

*Typically offered occasionally*

Students in this course gain an understanding of how companies plan, source, make and deliver their products with a global competitive advantage. The course stresses the engineering components in developing an integrated supply chain that covers the entire manufacturing enterprise. It looks at the supply-chain infrastructure and the velocities of different models. The focus is on understanding and detecting the constraints of the infrastructure and the lowest common denominator of the information system used. Students also gain an understanding of logistical networks and the optimizing of the various traffic and location alternatives. Synchronization of supply and demand is examined in detail, looking at variability in both processes with the objective of maximizing throughput and capacity, emphasizing partnering, e-commerce and the bullwhip effect. Finally, the course establishes global performance measurements that compare companies in different industries.

**Grading:** Grad Poly Graded

**Repeatable for additional credit:** No

**IE-GY 9113 Selected Topics in IE (3 Credits)**

*Typically offered occasionally*

These topics cover areas not covered in other courses. Specific topics vary according to instructor, who may be a visiting professor. Topics and prerequisites announced during the term before classes.

**Grading:** Grad Poly Graded

**Repeatable for additional credit:** Yes

**IE-GY 9303 Readings in Industrial Engineering I (3 Credits)**

In this course, students individually read selected papers and current literature in specialized area and are guided by a faculty member. |

Prerequisite: Approval of adviser, instructor and department head.

**Grading:** Grad Poly Graded

**Repeatable for additional credit:** Yes