

# MANUFACTURING ENGINEERING (MN-GY)

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

This course provides students with a solid foundation in the cost of quality, quality assurance and quality management. Emphasis is placed 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. This course uniquely demonstrates the power of teams of people with different expertise to improve quality. A course project is required. | Prerequisite: MA-GY 6513 Applied Statistics I (Data Analysis) or equivalent. Also listed as IE-GY 6113.

**Grading:** Grad Poly Graded

**Repeatable for additional credit:** No

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

This course reviews broadly the procedures involved in improving the quality of manufacturing. 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 troubleshooting methods to assure quality in manufacturing. Also listed as IE-GY 6123. | Prerequisite: MN-GY 6113 or IE-GY 6113.

**Grading:** Grad Poly Graded

**Repeatable for additional credit:** No

## **MN-GY 6303 Operations Management (3 Credits)**

This course examines analytical techniques to design and operate production and service systems, including facility layouts and locations, capacity planning, job sequencing, inventory control and quality control. Topics include introductory linear programming and other formal methods. Students use computers and case studies. | Also listed as MG-GY 6303.

**Grading:** Grad Poly Graded

**Repeatable for additional credit:** No

## **MN-GY 6323 BUILDING HIGH PERFORMANCE TEAMS (3 Credits)**

Successful manufacturing programs require the teaming of a number of professionals having a variety of types of expertise, such as product design, manufacturing-process design, production engineering, quality control, testing and packaging. In the past, these individual experts were involved only in a serial fashion in the overall product realization process, with not very effective results. Considerable evidence suggests that uniting these experts in a consistent team produces substantial benefits. This course provides students with the skills and knowledge to build work-unit effectiveness. Topics include diagnosing team functioning, understanding group dynamics, and creating a productive team culture, surfacing and resolving critical issues, and implementing strategies for organizational support.

**Grading:** Grad Poly Graded

**Repeatable for additional credit:** No

## **MN-GY 6513 DESIGN STRATEGIES (3 Credits)**

*Typically offered occasionally*

Product design is a major determinant of product cost, quality and customer satisfaction. This course explores the design process, including establishing customer requirements and developing product specifications, conceptual design, detailed design, design for manufacturability, competitive analysis and design for the environment. Computeraided applications and case studies are reviewed.

**Grading:** Grad Poly Graded

**Repeatable for additional credit:** No

## **MN-GY 7503 TARGET COSTING (3 Credits)**

*Typically offered occasionally*

Target Costing is a disciplined process for determining and realizing a total cost at which a product with specified functionality must be produced to generate the desired profitability at its anticipated selling price. This course presents both the theoretical foundation and the practical application of Target Costing methodology to the product-realization process. The topics include basic accounting, principles of Target Costing, the Target Costing Process, quantifying the customer requirements, defining the product feature set, price forecasting, experience curves, cost- functionality tradeoffs and implementation check lists. The course includes a hands-on design project in which teams of students will apply the principles of target costing to design a new product.

**Grading:** Grad Poly Graded

**Repeatable for additional credit:** No

## **MN-GY 7713 Product Realization Process (3 Credits)**

Getting new products developed and to market is a major factor in determining global competitiveness. This course uses case studies to illustrate the product-realization process and the successful application of R&D, concurrent engineering, cross-functional teams, continuous improvement, computer applications, target costing and management of new-product development.

**Grading:** Grad Poly Graded

**Repeatable for additional credit:** No

## **MN-GY 7763 MANUFACTURING RESOURCES PLANNING (3 Credits)**

This course discusses computerized systems to run a manufacturing business effectively. Also discussed are the process of software specification, evaluation, selection and implementation. Other topics include manufacturing resources planning logic, enterprise resource planning, manufacturing-execution systems, inventory management and bill of materials. Several software systems and their features are highlighted. Also listed as IE-GY 7763.

**Grading:** Grad Poly Graded

**Repeatable for additional credit:** No

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

This course introduces the basic concepts of manufacturing products with complex processes that rely heavily on computer and data-processing technologies. All aspects relative to products and processes- planning, design, manufacturing, shipping are addressed from a variety of perspectives. Techniques to manage and optimize manufacturing productivity are explored. Also listed as IE-GY 7853.

**Grading:** Grad Poly Graded

**Repeatable for additional credit:** No

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

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

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

*Typically offered occasionally*

This course concentrates 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 Just-In-Time/Total-Quality-Control, pull and synchronized manufacturing. Cultural factors are also discussed. | Also listed as IE-GY 7883.

**Grading:** Grad Poly Graded

**Repeatable for additional credit:** No

**MN-GY 7893 Production Science (3 Credits)**

*Typically offered occasionally*

This course reviews just-in-time and synchronous manufacturing methods. It analyzes the basic dynamics of factories to understand the importance of congestion and bottleneck rates on cycle time and inventories. Analytical models are developed to study variability and randomness introduced by breakdown, setups and batching. Simulation studies are used to provide data on performance of transfer lines.

**Grading:** Grad Poly Graded

**Repeatable for additional credit:** No

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

This course introduces concepts and techniques for economical, functionally sound and high-quality product design for manufacture. The emphasis is on designing for easy robotic and manual assembly, and on using plastics effectively to reduce manufacturing costs. Managerial and organizational approaches and case studies of successful designs are reviewed. | Also listed as IE-GY 7923.

**Grading:** Grad Poly Graded

**Repeatable for additional credit:** No

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

This course presents an overview of environmental, health and safety management. Students are introduced to management systems within a manufacturing operation. The course explores the motivations and strategies for environmental, health and safety management. Students learn about the mandatory standards along and about the technical and legal rationale for insuring that workers have a safe and healthy workplace. Because workers safety and health are protected by laws, these skills are needed to work effectively in operations; human resources and employee development as well as industrial relations. | Also listed under IE-GY 7933.

**Grading:** Grad Poly Graded

**Repeatable for additional credit:** No

**MN-GY 7953 Basics of Supply Chain Operations Management (3 Credits)**

Supply chain operations seeks to integrate and accelerate the flow of materials, information and cash, throughout the process of supplying goods or services. Supply chain operations optimizes the efforts of suppliers, manufacturers, warehouses, distributors, retailers and customers to create an efficient and robust process. On the service side the same concepts prevail with the suppliers, institutions, providers, administrators and customers. All businesses are part of a supply chain, and understanding and realizing this relationship leads to economies of time, material, money and improved customer service

**Grading:** Grad Poly Graded

**Repeatable for additional credit:** No

**MN-GY 7963 ELECTRONICS SYSTEM MANUFACTURING (3 Credits)**

In this course, students understand that the physical design and manufacturability of modern electronics systems results from tradeoffs involving partitioning, electrical performance, cooling and mechanical stresses. Design parameters are derived to study the tradeoffs, along with specific examples from reverse-engineering studies. The current status and future directions of lowcost, high-volume manufacturing technologies are examined.

**Grading:** Grad Poly Graded

**Repeatable for additional credit:** No

**MN-GY 7983 SUPPLY CHAIN INFRASTRUCTURE (3 Credits)**

Effective supply chain operations require well-designed, quality products, and the echelons of the supply chain must operate as a team. These elements, also termed the infrastructure, are presumed to exist. The objective of this course is to provide detailed information on the infrastructure elements required to operate a competitive supply chain. This infrastructure will cover product design and development, quality, employee involvement and communication, supplier and customer relationships, logistics, warehousing, information technology and e-business. Among the topics covered in detail will be product realization process and product design; house of quality; quality improvement process; six sigma; kaizan; employee motivation; communication and team dynamics; logistics including networks, third and fourth party organizations; warehousing, including optimum location, innovative information technology and e-business models.

**Grading:** Grad Poly Graded

**Repeatable for additional credit:** No

**MN-GY 7993 Supply Chain Engineering (3 Credits)**

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. | Also listed as IE-GY 7993.

**Grading:** Grad Poly Graded

**Repeatable for additional credit:** No

**MN-GY 8643 New Product Development (3 Credits)**

This course examines the dynamics of technology and the pressures of competition that drive enterprises to make their product-development and production processes strategically more effective and economically more cost and time efficient. The course covers the state of the art in new product activities for services and manufacturing firms. It also examines in-depth the linkages among marketing, technology and manufacturing technology. | Also listed as MG-GY 8643.

**Grading:** Grad Poly Graded

**Repeatable for additional credit:** No

**MN-GY 8653 Managing Technological Change and Innovation (3 Credits)**

This course focuses on how to manage effectively technological change and innovation by using a dual perspective. One perspective is based on individual, group and organizational theory, research and practice. This body of literature, viewpoints and experience provides essential guides to manage successfully the introduction of new technologies. Realizing the full potential of new technologies requires managing change effectively to assure 100 percent stakeholder commitment. The second perspective is based on innovation theory, research and practice. This body of literature, viewpoints and experience provides key insights to manage effectively the process of innovation and the impact of innovation on all parts of an enterprise. Specifically, explicit consideration is given to a firm's to manage and inspire people so that they can communicate and innovate effectively. | Also listed as MG-GY 8653

**Grading:** Grad Poly Graded

**Repeatable for additional credit:** No

**MN-GY 9113 Selected Topics in Manufacturing Engineering I (3 Credits)**

Areas not covered in other courses. Specific topics vary according to the instructor, who may be a visiting professor. Topics and prerequisites are announced during the term before the offering.

**Grading:** Grad Poly Graded

**Repeatable for additional credit:** Yes

**MN-GY 9303 READINGS IN MANUFACTURING ENGINEERING I (3 Credits)**

In this course, students read selected papers and current literature in specialized area of study and are guided by a faculty member. The topic must be beyond the scope of regularly offered courses. The topic must be agreed upon by the student and adviser before registration. A written report on the topic is required. | Prerequisites: approval of adviser, instructor and department head.

**Grading:** Grad Poly Graded

**Repeatable for additional credit:** No

**MN-GY 9313 READINGS IN MANUFACTURING ENGINEERING II (3 Credits)**

In this course, students read selected papers and current literature in specialized area of study and are guided by a faculty member. The topic must be beyond the scope of regularly offered courses. The topic must be agreed upon by the student and adviser before registration. A written report on the topic is required. | Prerequisites: approval of adviser, instructor and department head.

**Grading:** Grad Poly Graded

**Repeatable for additional credit:** No

**MN-GY 9963 MS REPORT I (3 Credits)**

This course is an independent project that demonstrates a student's professional maturity and graduate-level knowledge. Students, guided by an adviser, are expected to demonstrate experimental work, software development and extensive analyses. A student's report must include results in one or more of these areas: critical analysis and interpretation of pertinent literature. A required written report (unbound) should represent a worthy contribution. | Prerequisite: adviser's approval.

**Grading:** Grad Poly Graded

**Repeatable for additional credit:** No

**MN-GY 9973 MS PROJECT II (3 Credits)**

With approval by the graduate adviser, some students may take a 6-unit MS report. This report should be planned during registration for MN-GY 9963. In such cases, MN-GY 9973 is used for the second half of the registration. A grade of S or U is awarded in MN-GY 9963 in these cases, and the letter grade given in MN-GY 9973 applies to all 6 units. | Prerequisite: adviser's approval.

**Grading:** Grad Poly Graded

**Repeatable for additional credit:** No