
MFS Manufacturing Systems Engineering

MFS 503 LEAN MANUFACTURING PRINCIPLES AND PRACTICES. (3)

Introduction of the fundamental concepts for production improvement utilizing lean manufacturing principles and practices. This course will consist of lectures, manufacturing simulation laboratory, plant tours, design projects, and assigned problems drawn from industry. Prereq: Enrollment restricted to junior-level or above students. (Same as ME 503.)

MFS 505 MODELING OF MANUFACTURING PROCESSES AND MACHINES. (3)

A study of the major manufacturing processes and equipment. Emphasis on mathematical and computer models of these processes, as used in automated manufacturing and control of these processes. Lecture, two hours; laboratory; two hours. Prereq: EM 302, EM 313, and engineering standing; or graduate standing with instructor consent. (Same as ME 505.)

MFS 507 DESIGN FOR MANUFACTURING. (3)

The topics will include fundamentals of concurrent engineering, product life cycle, product specification, standardization, functional requirements and datum features, selection of materials and manufacturing processes, cost analysis, case studies on designing for quality, economy, manufacturability and productivity. Prereq: ME 344 and engineering standing. (Same as ME 507.)

MFS 512 MANUFACTURING SYSTEMS. (3)

This course introduces students to fundamentals of design, planning and control of manufacturing systems aided by computers. Concepts of control hardware, NC programming languages, software aspects related to NC manufacturing, programmable controllers, performance modeling of automated manufacturing systems, group technology and flexible manufacturing systems, etc. will be addressed. Prereq: Engineering standing. (Same as ME 512.)

MFS 525 ORGANIZATIONAL LEARNING FOR LEAN MANUFACTURING. (3)

Learning organizations are skilled at creating, acquiring, and transferring knowledge, and at modifying their behavior to reflect the new knowledge and insights. In this context, this course will discuss leadership styles, adult learning principles, communication, organizational behaviors, and a structure for learning. Prereq: MFS 503 or consent of instructor.

MFS 526 OPERATIONS MANAGEMENT IN LEAN MANUFACTURING. (3)

Principles and practices of lean manufacturing operations management. The focus is on manufacturing as a sociotechnical system and how to limit variability through various methods of control of basic processes. Emphasis is on managing an effective and efficient technical system. Prereq: Enrollment restricted to junior-level or above students.

MFS 554 CHEMICAL AND PHYSICAL PROCESSING OF POLYMER SYSTEMS. (3)

Theory and practice as related to the chemical and physical processing of polymer systems. Polymer rheology, heat transfer in polymer flows, polymer engineering properties. Polymer processing operations and materials selection; flow instabilities. Prereq: CME 330, CME 425 or ME 325; or consent of instructor. (Same as CME/ME/MSE 554.)

MFS 563 SIMULATION OF INDUSTRIAL PRODUCTION SYSTEMS. (3)

Discrete event simulation and its application to performance analysis of industrial production systems. Topics include concepts for characterizing production systems, approaches to structuring simulation models, instruction in a simulation language, and techniques for comparing alternative system designs and control strategies. Applications to manufacturing, commercial and mining production systems are considered. Prereq: CS 221 or 270, STA 281 or 381, engineering standing. (Same as MNG 563.)

MFS 599 TOPICS IN MANUFACTURING SYSTEMS ENGINEERING (Subtitle required). (3)

A detailed investigation of a topic of current significance in manufacturing systems engineering such as: computer-aided manufacturing, special topics in robotics, and lean/agile manufacturing. May be repeated under different subtitles to a maximum of six credits. A particular topic may be offered at most twice under the MFS 599 number. Prereq: Variable; given when topic is identified.

MFS 603 MANAGEMENT FOR A LEAN SYSTEM. (3)

This course provides the MFS student an opportunity to develop skills in managing a lean system at the 'shop floor' level.

MFS 605 SYSTEMS FOR FACTORY INFORMATION AND CONTROL. (3)

Systems approach to manufacturing. Hardware and software for real time control and reporting. Sensor and actuators, controllers, networks, databases, hierarchical and distributed control, CAD/CAM systems, flexible manufacturing systems, group technology, modeling and simulation of factory operations. Lecture, two hours; laboratory, two hours. Prereq: MFS 505. (Same as EE 605.)

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- MFS 606 SEMINAR AND PROJECT IN MANUFACTURING SYSTEMS ENGINEERING. (3)**
A project course for manufacturing systems. Course consists of seminar presentations by outside professionals and faculty and a course project on a realistic manufacturing systems assignment. Lecture, two hours; laboratory, two hours. (Same as EE/ME 606.)
- MFS 607 ANALYSIS OF METAL CUTTING PROCESSES. (3)**
Advanced study of metal cutting involving the mechanics of metal cutting including cutting forces, tool-wear/tool-life and temperature analysis, surface finish and integrity, chip control, machinability assessments and advances in cutting tool technology. Prereq: ME 505. (Same as ME/MSE 607).
- #MFS 609 LEADERSHIP FOR A LEAN SYSTEM. (3)**
Leadership competencies presented in this course are: Design of infrastructure; Toyota model for developing leaders; Importance of matrix structures; Organization behavior dimensions; Human resource management strategy; Procurement systems dynamics; Operations dynamics; distribution logistics; and customer relations. Course presentation will utilize lecture and case study. Prereq: MFS 503.
- MFS 611 ORGANIZATIONAL BEHAVIOR. (3)**
A critical examination of behavior and performance within organizations and between organizations. Special attention is paid to the problem of performance at the individual, group, and formal organizational level. Prereq: Enrollment in Manufacturing Systems Engineering Program. (Same as MGT 611.)
- MFS 612 DESIGN OF LEAN MANUFACTURING SYSTEMS. (3)**
Technical design of manufacturing systems in accordance with lean manufacturing principles. Topics include models for characterization and analysis of factory flow dynamics, production flow analysis, work cell design, and design of pull-based production control systems. Prereq: MFS 503 Lean Manufacturing Principles and Practices.
- MFS 681 SUSTAINABLE QUALITY SYSTEMS DESIGN. (3)**
This course provides the theory and principles of sustainable quality production systems as originally developed by Shewhart and Deming. The course will focus on statistical methods from the viewpoint of quality control: at the product specification level; at the product production level; and at the judgment of quality at the inspection level. Prereq: Basic statistics.
- MFS 699 TOPICS IN MANUFACTURING SYSTEMS ENGINEERING (Subtitle required). (1-3)**
A detailed investigation of a topic of current significance in manufacturing systems engineering such as: computer-aided manufacturing, special topics in robotics, and lean/agile manufacturing. May be repeated under different subtitles to a maximum of six credits. A particular topic may be offered at most twice under the MFS 699 number. Prereq: Variable; given when topic is identified.
- MFS 748 MASTER'S THESIS RESEARCH. (0)**
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.
- MFS 768 RESIDENCE CREDIT FOR MASTER'S DEGREE. (1-6)**
May be repeated to a maximum of 12 hours.
- MFS 780 SPECIAL PROBLEMS IN MANUFACTURING SYSTEMS ENGINEERING. (3)**
Course consists of specialized individual work in manufacturing systems engineering. Laboratory, nine hours. May be repeated to a maximum of nine credits. Prereq: Approval of instructor.
- MFS 784 RESEARCH PROJECT IN MANUFACTURING SYSTEMS ENGINEERING. (3)**
Individual study related to a special research project supervised by the student's advisor. A final written report on the project is required. This course is open only to and required by students pursuing the M.S. in MFS degree with a non-thesis option (Plan B). The course cannot satisfy part of the required thirty hours of course work for Plan B. Prereq: Approval of student's advisor.