

# Manufacturing Systems Engineering (MSE)

## Courses

### **MSE 356 Micromanufacturing Systems & Technologies 3 Credits**

Manufacturing engineering in microelectronics, microelectromechanical, nano-, opto- and micro-scale manufacturing. Examination of systems design, equipment, process and operational issues and linkages to business strategies. Crystal growth, thin film deposition processes and patterning, removal processes, vacuum engineering, contamination control, clean room practices etc. Individual research assignments. Note: 300 level course may not be repeated at the 400 level for credit.

### **MSE 362 (ISE 362) Logistics and Supply Chain Management 3 Credits**

Modeling and analysis of supply chain design, operations, and management. Analytical framework for logistics and supply chains, demand and supply planning, inventory control and warehouse management, transportation, logistics network design, supply chain coordination, and financial factors. Industry case studies and a comprehensive final project.

### **MSE 401 (ME 401) Integrated Product Development 3 Credits**

An integrated and interdisciplinary approach to engineering design, concurrent engineering, design for manufacturing, industrial design and business of product development. Design methods, philosophy and practice, the role of modeling and simulation, decision making, risk, cost, materials and manufacturing process selection, platform and modular design, mass customization, quality, planning and scheduling, business issues, teamwork, group dynamics, creativity and innovation. Case studies and team projects with geographically dispersed team members.

### **MSE 402 Introduction to the Organization and Its Environment 2 Credits**

Designed to provide a thorough understanding of business organizations by examining strategies middle and senior managers use to create and sustain organizational competitive advantage. The course examines the organization from an overall perspective within the context of the firm's internal and external environment. The second aspect of the course deals with the ability to communicate effectively in today's business environment. Students will examine and practice communications strategies and skills that are essential to their success in business.

### **MSE 403 Global Competitive Environment 1 Credit**

Experimental projects in selected fields of manufacturing systems engineering, approved by the instructor that discuss the global competitive environment in the context of material covered in MBA 401/MSE 402.

**Repeat Status:** Course may be repeated.

### **MSE 431 Marketing & the Invention to Innovation Process 3 Credits**

Organizational issues and decision-making for capital investments in new technologies. The commercialization process is traced from research and development and marketing activities through the implementation phase involving the manufacturing function. Term project is a commercialization plan for a new manufacturing technology.

### **MSE 438 Agile Organizations & Manufacturing Systems 3 Credits**

Analysis of the factors contributing to the success of manufacturing enterprises in an environment characterized by continuous and unpredictable change. Fundamentals of lean production: aspects of systems design, value stream analysis, flow, set-up and cycle time reduction, kaizen, elimination of waste. Fundamentals of agility: global enterprises, virtual organizations, adapting to change, mass customization, manufacturing flexibility, activity-based management.

### **MSE 443 (ISE 443) Automation and Production Systems 3 Credits**

Principles and analysis of manual and automated production systems for discrete parts and products. Cellular manufacturing, flexible manufacturing systems, transfer lines, manual and automated assembly systems, and quality control systems.

### **MSE 446 International Supply Chain Management 3 Credits**

Financial and managerial issues. Evaluation, selection, development and management of suppliers; business models, financial reporting strategies, earnings, quality, risk assessment and internal control, team based new product development. Selected readings, case studies, discussions, lectures, group projects, and presentations.

### **MSE 451 Manufacturing Systems Engineering Project 1-3 Credits**

### **MSE 456 Micromanufacturing Systems & Technologies 3 Credits**

Manufacturing engineering in microelectronics, microelectromechanical, nano-, opto- and micro-scale manufacturing. Examination of systems design, equipment, process and operational issues and linkages to business strategies. Crystal growth, thin film deposition processes and patterning, removal processes, vacuum engineering, contamination control, clean room practices etc. Individual research assignments. Note: 300 level course may not be repeated at the 400 level for credit.

### **MSE 472 Special Topics 1-3 Credits**

Special Topics 1-3 credits.

### **MSE 482 Aspects of Sustainable Systems Design 3 Credits**

Design of sustainable systems for manufacturing that fulfill human needs and generate wealth. Demographic, ecological, economic, environmental, ergonomic, health and global or local socio-political impacts on design and operation of future systems. Conservation of resources in the design, manufacture and use of products, processes, and implementation systems; life cycle engineering, reclamation, recycling, remanufacture. Research-based term paper.

### **MSE 490 Manufacturing Systems Engineering Thesis 1-6 Credits**

### **MSE 499 Dissertation 0-15 Credits**