Manufacturing Systems Engineering

The manufacturing systems engineering program develops engineers who can design, install, operate, and modify systems involving materials, processes, equipment, facilities, logistics and people using leading edge technologies. It integrates systems perspectives with interdisciplinary course offerings from Lehigh’s colleges of engineering and applied science, and business and economics.

Lehigh’s award-winning graduate program leading to the cross-disciplinary master of science degree in manufacturing systems engineering (MSE) is administered by the Center for Manufacturing Systems Engineering within the P.C. Rossin College of Engineering and Applied Science. In addition, the College of Business and Economics participates in teaching accounting, business, finance, management, and marketing aspects affecting manufacturing systems.

This graduate curriculum aims to develop engineers who can design, develop, install, operate and modify manufacturing systems involving materials, processes, equipment, facilities, logistics, and people using leading edge technologies. A systems perspective is integrated by means of interdisciplinary course offerings.

DISTANCE EDUCATION
It is possible for distance students to earn the MS in MSE degree remotely.

MAJOR REQUIREMENTS
For further information contact: Carolyn Jones, MSE Program Coordinator, 200 West Packer Avenue, Bethlehem, PA 18015 (610) 758-5157, FAX (610) 758-6527, Email ccj1@Lehigh.edu or visit the MSE web site at https://mse.lehigh.edu

ADMISSION REQUIREMENTS
• A bachelor’s degree in engineering or an appropriate science is required.
• All candidates must have at least six months work experience in industry.
• All candidates must follow admission procedures and standards established by Lehigh University.

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
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 3 Credits
MSE 481 (GBUS 481) Technology, Operations & Competitive Strategy 3 Credits
Interrelationships among advanced manufacturing management, technology and competitive strategy of the firm. Industry analysis and competitiveness; competitive strategy formulation and implementation; value chain analysis; manufacturing and technology strategy; manufacturing’s contribution to competitive advantage in quality, cost, variety and new product availability; segmentation and substitution; vertical integration.

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