MANUFACTURING & PRODUCTION SYSTEMS

FACULTY
J. Li, 3222 ME, 608-890-3780
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PREREQUISITES
- BS degree or equivalent
- Mathematical statistics course (Ex: Stat312)
- Computer programming course (Ex: CS302)
- 3 courses in ISyE (Ex: 313, 315, 320, 323, 349, 415, 417)

The Associate Chair of Graduate Affairs is responsible for evaluating equivalencies.

PROGRAM DESCRIPTION
The specialization in Manufacturing and Production Systems is intended to provide the skills and knowledge necessary to compete successfully in a manufacturing environment. These skills include knowledge of the theory of manufacturing materials and processes and their control; knowledge of the essentials of manufacturing systems design and analysis; and knowledge of and hands-on experience with modern manufacturing technology.

MS DEGREE REQUIREMENTS
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(30 CREDITS TOTAL)
All students need to have 30 credits with the following sub-requirements: 12 credits from broad core courses; 6 credits from track-specific core courses; and the rest from technical electives. Maximum 6 credits of independent study may be used.

BROAD CORE COURSES (12 credits)
Select one course from each category:

1. Optimization
   - ISyE 525 Linear Programming Methods
   - ISyE 524 Introduction to Optimization

2. Probability and Stochastic Modeling
   - ISyE 624 Stochastic Modeling Techniques
   - ISyE 632 Introduction to Stochastic Modeling
   - ISyE 643 Performance Analysis of Manufacturing Systems

3. Simulation
   - ISyE 620 Simulation Modeling and Analysis

4. Statistics and Decision Analysis
   - ISyE 512 Inspection, Quality Control, and Reliability
   - ISyE 516 Introduction to Decision Analysis
   - ISyE 575* Introduction to Quality Engineering
   - Stat 424* Statistical Experimental Design for Engineers

*Only one of ISyE 575 and Stat 424 may count toward the MS degree.

TRACK CORE COURSES (6 credits)
Select two courses from:
- ISyE 510 Facilities Planning
- ISyE 605 Computer Integrated Manufacturing

TECHNICAL ELECTIVES (12 credits)
At least 6 credits must be ISyE courses or cross-listed with ISyE
These courses are chosen to meet your interests and career goals. Courses need to be at the 400 level or above.

Sample electives:
- Any of the courses listed as broad core courses or track core courses are acceptable as electives, provided that they are not used to fulfill other requirements.
- Courses in ISyE, such as:
  - ISyE 415 Introduction to Manufacturing Systems, Design and Analysis
  - ISyE 425 Intro to Combinatorial Optimization
  - ISyE 449 Sociotechnical Systems in Industry
  - ISyE 515 Engineering Management of Continuous Process Improvement
  - ISyE 612 Information Sensing and Analysis for Manufacturing Processes
  - ISyE 641 Design and Analysis of Manufacturing Systems
  - ISyE 658 Managing Technological Change in Manufacturing Systems
  - ISyE 671 E-Business: Technologies, Strategies and Applications
- Other ISyE courses could also be elected
- Courses in Engineering, Sciences, Mathematics, Statistics, Business, Computer Sciences, Economics, Population Health Sciences, or Psychology if it is approved by your advisor

PROGRAM CHANGES
Changes from the standard curriculum MUST BE APPROVED (in writing) by the student’s advisor.
EXIT REQUIREMENTS

In order to be eligible for graduation, a Master’s student must:

- Have a GPA of 3.0 or higher
- Meet all MS degree requirements for their focus area
- Have all grades entered, except for the current semester. No Is or NRs can show on the student’s transcript.
- Be enrolled in at least 2cr the semester in which they graduate.
- Have their MS degree warrant signed and dated by the degree deadline.

LABORATORIES & CENTERS

- Flexible Manufacturing Cell Laboratory
- Manufacturing Enterprise Systems Optimization Laboratory
- Manufacturing Systems Analysis Laboratory
- Laboratory for Manufacturing Process Analysis and Control (MPAC)
- Production and Service Systems Laboratory

Flexible Manufacturing Cell Laboratory
This laboratory enables integrated design, manufacturing, inspection, and assembly. It includes CAD/CAM systems, CNC milling and turning centers, an automated storage and retrieval system, a material-handling conveyor and robots, a CMM integrated with a computer-aided inspection system, and an assembly robot having tactile- and vision-sensing capabilities.

Manufacturing Enterprise Systems Optimization Laboratory
In this laboratory, students and faculty members perform research on new methodologies and tools for modeling, design, and optimization of manufacturing systems. Research conducted in this laboratory utilizes many interesting mathematical models and techniques from computer science, control theory, and operations research. Resources available include personal computers, and a variety of software tools.

Manufacturing System Analysis Laboratory
In this laboratory, students and faculty members perform research on new techniques for modeling and analysis of manufacturing systems, and application of these techniques to enable time-based competitive manufacturing. The laboratory consists of several computers equipped with state-of-the-art system analysis tools.

Laboratory for Manufacturing Process Analysis and Control (MPAC)
In this laboratory, we focus on interdisciplinary research on new methodologies of data analysis, knowledge discovery, and control of manufacturing processes for quality and productivity improvement. The research is based on the fusion of the diverse information sources, such as the in-process sensing information of the machine conditions, and the final product quality information, and the discrete event signals from the logic controller of the process. The research utilizes theories of engineering field knowledge, signal processing, advanced statistical analysis, and system and control.

Production and Service Systems Laboratory
In this laboratory, students and faculty members carry out research on developing rigorous engineering theory for modeling, analysis, improvement and control of production, healthcare, and service systems, and applying the derived results in practice. All the problems studied are important issues originated from industry, after abstraction and theoretical derivations, their solutions have been successfully implemented on the factory floor or in hospitals and clinics. The laboratory is equipped with several computers and cutting edge software tools.

JOB PLACEMENT

Engineering Career Services Office
Suite 170, 1410 Engineering Drive (CAE)
Madison, WI 53706
Tel: (608) 262-3471
FAX: (608) 262-7262
https://www.engr.wisc.edu/academics/student-services/career-services/

FURTHER INFORMATION

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