MANUFACTURING & PRODUCTION
SYSTEMS

Department of Industrial and Systems Engineering
UNIVERSITY OF WISCONSIN—MADISON

FACULTY
J. Li, 3222 ME, (608) 890-3780
A. Krishnamurthy, 3258 ME, (608) 890-2236
L. Shi, 3250 ME, (608) 265-5969
D. Veeramani, 4101 ME, (608) 262-0861
S. Zhou, 3254 ME, (608) 262-9534

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
(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.

- Please note if you earn a grade of C or below in a course you CANNOT count that course toward the 30-credit requirement.

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

1) Optimization
   ISyE 525  Linear Programming Methods
   ISyE 635  Tools and Environments for 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 the ISyE 575 and Stat 424 may count toward the MS Degree.

PREREQUISITES FOR MS & PhD

- BS degree or equivalent
- Mathematical statistics (ex: Stat 321)
- Computer programming (ex: CS 302)
- 3 courses in ISyE: 313, 315, 320, 323, 349, 415, 417

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

PROGRAM DESCRIPTION

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

MS DEGREE REQUIREMENTS

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.

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

TRACK CORE COURSES (6 credits)
Select two courses from:
ISyE 510  Facilities Planning
ISyE 605  Computer Integrated Manufacturing
ISyE 615  Production Systems Control

TECHNICAL ELECTIVES (12 credits)
At least 6 credits must be ISyE courses or cross-listed with ISYE

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

These courses are chosen to meet your interests and career goals. Courses need to be at the 400 level or above.
Other ISyE courses could 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 OUTCOMES

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 I’s or NR’s can show on the student’s transcript.
- Be enrolled in at least 2 credits 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)

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 interdisciplinary 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.

JOB PLACEMENT

Engineering Career Services Office
1550 Engineering Drive, Room M1002
Madison, WI 53706
Tel: (608) 262-3471
FAX: (608) 262-7262
http://www.engr.wisc.edu/services

FURTHER INFORMATION

University of Wisconsin-Madison
ISyE Graduate Student Services
3182 Mechanical Engineering
1513 University Avenue
Madison, WI 53706
Tel: (608) 263-4025
Fax: (608) 890-2204
Email: coegradadmission@wisc.edu
http://www.engr.wisc.edu/ie