QUALITY ENGINEERING

DEPARTMENT OF Industrial and Systems Engineering
College of Engineering University of Wisconsin-Madison

FACULTY

P. Carayon, 3222 ME, 608-262-9797
S. Zhou, 3254 ME, 608-262-9534
D. Zimmerman, 1163 WARF, 608-263-4875

PREREQUISITES

- BS degree or equivalent
- Mathematical statistics (example: Stat312)
- Computer programming (example: CS302)
- 3 courses in ISyE: 313, 315, 320, 323, 349, 415, 417

The Associate Chair in charge of graduate affairs is responsible for evaluating equivalencies.

PROGRAM DESCRIPTION

Ever increasing global competition has sparked renewed interest in quality improvement of products and services. This, in conjunction with the greater complexity of modern production and service systems, has created a demand for engineers who can master the technical and managerial tools and concepts needed for the economic implementation of quality systems. To meet this demand the graduate program concentration in Quality Engineering exists to prepare students for careers as quality professionals in industry, health care, consulting, research, and teaching.

The MS degree is designed to provide necessary background for a professional career in industry or government. Emphasis is placed on the foundations of quality improvement, organizational dynamics/change strategies, business and statistical methods. There is a flexible elective list of courses to enable the student to also develop skills in manufacturing systems, health systems, service systems, and decision sciences.

The Ph.D. degree in Industrial Engineering with a concentration in Quality Engineering seeks to qualify students for leadership positions in research, consulting, government and industry as well as for positions on university faculties in industrial engineering, business and related fields.

The curriculum is designed to provide the student with a balance and breadth of understanding of industrial engineering disciplines that contribute to designing and delivering high quality products or services safely and efficiently. To accomplish this, courses can be selected from each of four groupings: (1) foundation courses; (2) organizational dynamics/change strategies and sociotechnical engineering; (3) statistical methods, and (4) a grouping consisting of Industrial Engineering and Business electives.

CURRICULUM

The curriculum is designed to provide the student with a balance and breadth of understanding of industrial engineering disciplines that contribute to designing and delivering high quality products or services safely and efficiently. To accomplish this, courses can be selected from each of four groupings: (1) foundation courses; (2) organizational dynamics/change strategies and sociotechnical engineering; (3) statistical methods, and (4) a grouping consisting of Industrial Engineering and Business electives.

FOUNDATION COURSES (All Required, 12 cr)

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISyE/ME 512</td>
<td>Inspection, Quality Control, and Reliability</td>
</tr>
<tr>
<td>ISyE 515</td>
<td>Engineering Management of Continuous Process Improvement</td>
</tr>
<tr>
<td>ISyE 520</td>
<td>Quality Assurance Systems</td>
</tr>
<tr>
<td>ISyE 575</td>
<td>Introduction to Quality Engineering</td>
</tr>
</tbody>
</table>

ORGANIZATIONAL DYNAMICS/CHANGE & SOCIOTECHNICAL SYSTEMS (6 cr min)

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISyE/Psych 652</td>
<td>Sociotechnical Systems</td>
</tr>
<tr>
<td>ISyE/Psych 653</td>
<td>Organization and Job Design</td>
</tr>
<tr>
<td>ISyE/Psych 753</td>
<td>Seminar in Organization &amp; Job Design</td>
</tr>
<tr>
<td>ISyE 854</td>
<td>Special Topics in Organizational Design</td>
</tr>
<tr>
<td>MHR 700</td>
<td>Organizational Behavior</td>
</tr>
<tr>
<td>OTM 770</td>
<td>Introduction to Quality &amp; Productivity Improvement</td>
</tr>
</tbody>
</table>

STATISTICAL METHODS (3 cr min)

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISyE 612</td>
<td>Information Sensing and Analysis for Manufacturing</td>
</tr>
<tr>
<td>STAT 333</td>
<td>Applied Regression Analysis</td>
</tr>
<tr>
<td>STAT 349</td>
<td>Introduction to Time Series</td>
</tr>
<tr>
<td>STAT 411</td>
<td>Introduction to Sample Survey Theory and Methods</td>
</tr>
<tr>
<td>STAT 421</td>
<td>Applied Categorical Data Analysis</td>
</tr>
<tr>
<td>STAT 701</td>
<td>Applied Time Series Analysis—Forecasting and Control</td>
</tr>
<tr>
<td>STAT 756</td>
<td>Multivariate Analysis</td>
</tr>
<tr>
<td>STAT 803</td>
<td>Experimental Design I</td>
</tr>
<tr>
<td>STAT 849</td>
<td>Theory and Application of Regression and Analysis of Variance I</td>
</tr>
</tbody>
</table>
CURRICULUM
Continued

IE ELECTIVES (3 cr min)
ISyE 417  Health Systems Engineering
ISyE/ME 513  Analysis of Capital Investments
ISyE 610  Design of Program Evaluation Systems
ISyE 613  Systems Evaluation
ISyE/OTM 620  Simulation Modeling & Analysis
ISyE/ME 641  Design & Analysis of Manufacturing Systems
ISyE 658/  Managing Technological Change in Manufacturing Systems
OTM 758
ISyE 691  Special Topics in ISYE (need advisor consent)
ISyE 946  Advanced Topics in Mfg Systems

BUSINESS ELECTIVES (3 cr min)
Suggested courses:
MHR 700  Organizational Behavior
MHR 705  Human Resource Management
MHR 720  Organization & Management Processes
MHR 722  Entrepreneurial Management
OTM 860  Planning for Quality in New Products & Services
OTM 861  Strategic Breakthrough Management & Quality Planning

INDEPENDENT STUDY (3 cr required)
Three additional credits approved in advance by the student’s advisor are also required. Independent study or an actual quality improvement project from an industrial, health, or service area is required for the 3 credits.

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 2 cr the semester in which they graduate.
- Have their MS degree warrant signed and dated by the degree deadline.

DOCTORAL REQUIREMENTS
The requirements for the Ph.D. degree include a minimum number of 32 credits, and include research in area of specialization, satisfactory performance in the Qualifying Exam, the Preliminary Exam, and a successful defense of a Ph.D. thesis. Admission and GPA requirements are the same as those specified by the ISyE Department.

RECENT PhD THESIS TITLES


RESEARCH FACILITIES
Center for Health Systems Research & Analysis
Center for Quality and Productivity Improvement
Quality Engineering and System Transitions Lab
Interactive Health Communications Laboratory
Experimental Design and Process Improvement Laboratory

JOB PLACEMENT
Engineering Career Services Office
Engineering Centers Building
1550 Engineering Drive, Room M1002
Madison, WI 53706
Tel: (608) 262-3471
FAX: (608) 262-7262
ECS Web Address is: http://ecs.engr.wisc.edu

FURTHER INFORMATION
University of Wisconsin-Madison
Industrial and System Engineering Department
1513 University Avenue, Room 3270
Madison, WI 53706-1572
Tel: (608) 262-2686
FAX: (608) 262-8454
Email: ie-admission@engr.wisc.edu
IE Department Web Address: http://www.engr.wisc.edu/ie

Updated 2.22.11