



**Department of Industrial
and Systems Engineering**
UNIVERSITY OF WISCONSIN-MADISON

Quality Engineering

Faculty

- Pascale Carayon, 3126 ECB
- Kaibo Liu, 3017 ME
- Shiyu Zhou, 3254 ME

PREREQUISITES

- BS Degree or equivalent
- Mathematical statistics (Ex. Stat 312)
- Computer programming (Ex. CS 302)
- Three courses in ISYE (Ex: 313, 315, 320, 323, 349, 415, 417)

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

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 PhD 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.

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 and Business electives.

1) Foundation Courses (12 cr)

- **ISyE 412:** Fundamental Industrial Data Analytics
- **ISyE/ME 512:** Inspection, Quality Control, (or **ISyE 612**) and Reliability
- **ISyE 515:** Engineering Management of Continuous Process Improvement
- **ISyE 520:** Quality Assurance Systems
- **ISyE 575:** Introduction to Quality Engineering

2) Organizational Dynamics/ Change & Sociotechnical Systems (6cr min)

- **ISyE/Psych 652:** Sociotechnical Systems
- **ISyE/Psych 653:** Organization and Job Design
- **ISyE 854:** Special Topics in Organizational Design
- **MHR 700:** Organizational Behavior
- **OTM 770:** Introduction to Quality & Productivity Improvement

3) Statistical Methods (3cr min)

- **ISyE 612:** Information Sensing and Analysis for Manufacturing
- **STAT 333:** Applied Regression Analysis
- **STAT 349:** Introduction to Time Series
- **STAT 411:** Introduction to Sample Survey Theory and Methods

- **STAT 421:** Applied Categorical Data Analysis
- **STAT 701:** Applied Time Series Analysis – Forecasting and Control
- **ED PSYCH 862:** Multivariate Analysis
- **STAT 803:** Experimental Design I
- **STAT 849:** Theory and Application of Regression and Analysis of Variance I

4) ISyE Electives (3 cr min)

- **ISyE 417:** Health Systems Engineering
- **ISyE/ME 513:** Analysis of Capital Investments
- **ISyE 601:** Special Topics in ISyE (need advisor consent)
- **ISyE 610:** Design of Program Evaluation Systems
- **ISyE/OTM 620:** Simulation Modeling & Analysis
- **ISyE/ME 641:** Design & Analysis of Manufacturing Systems
- **ISyE 658/OTM 758:** Managing Technological Change in Manufacturing Systems

4) 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

Three additional credits approved in advanced 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 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.
- Please note if you earn a grade of C or below in a course you **CANNOT** count that course toward the 30-credit requirement.

DOCTORAL REQUIREMENTS

The requirements for the PhD 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 PhD thesis. Admission and GPA requirements are the same as those specified by the ISyE Department.

PAST PhD THESIS TITLES

- De Pinho, André L. S., 2003, "Follow-up Experiments to Remove Confounding Between Location and Dispersion Effects in Unreplicated Two-Level Factorial Designs." (Advisor: H. Steudel)
- Paniagua Quiñones, María del Carmen, 2004, "Use of Strip-Plot Designs for Three-Stage and Multi-Stage Processes for Robust Product Design". (Advisor: H. Steudel)

RESEARCH FACILITIES

- **Center for Health Systems Research & Analysis (CHSRA)**
- **Center for Quality and Productivity Improvement (CQPI)**
- **Quality Engineering and System Transitions Lab**
- **Interactive Health Communications Laboratory**
- **Experimental Design and Process Improvement Laboratory**

JOB PLACEMENT

Engineering Career Services Office

Engineering Career Services Office
1150 Engineering Hall
1415 Engineering Drive
Madison, WI 53706
Tel: (608) 262-3471
Email: ecs@engr.wisc.edu
<https://ecs.wisc.edu>

FURTHER INFORMATION

ISyE Graduate Student Services

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