



Department of Industrial and Systems Engineering

UNIVERSITY OF WISCONSIN-MADISON

Health Systems Engineering

Core Faculty

- Oguzhan Alagoz, 3242 ME
- Pascale Carayon, 3130 ECB
- Jingshan Li, 3222 ME
- Raj Veeramani, 4101 ME
- Nicole Werner, 3021 ME
- Doug Wiegmann, 3214 ME
- Gabriel Zayas-Caban, 3011 ME

Affiliate Faculty

- John Beasley, Verona Clinic
- Molly Carnes, 700 Regent St.
- Eneida Mendonca, Health Innovation Program
- James Robinson, WARF
- Mary Sesto, MSC 5110
- Linsey Steege, Box 2455 CSC
- Bruce Tomadsen, B1143 WIMR
- David Vanness, 785 WARF

ADMISSION NOTICE

The foundation courses for this degree program are offered both Fall and Spring semesters and are prerequisite to most other courses in the program.

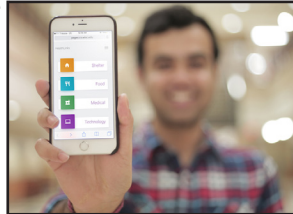
PREREQUISITES

- BS degree or equivalent
- Mathematical statistics (Ex: Stat312)
- Computer programming (Ex: CS302)
- 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 healthcare industry, one of the largest industries in the United States, accounts for 18% of the US gross domestic product. Recent changes in the organization and financing of health services have created enormous incentives to increase the productivity of the health system while maintaining or improving quality. Industrial engineers possess tools to analyze demands and create systems to resolve these problems. The health systems specialization seeks to train students to look at broad issues in health care, including hospitals and clinics, health promotion and prevention, long-term care, quality improvement and management, health care financing and technology, programs and systems evaluation.



While skills in designing and manipulating statistical and mathematical models are essential to an industrial engineer's success, the health systems engineer must also be able to initiate and implement resolutions to strategic problems using knowledge of how organizational decisions are made.

Potential employers for MS-prepared health systems engineers include all healthcare institutions, governmental and voluntary agencies, universities and medical centers, research and planning organizations, manufacturers of healthcare products, pharmaceutical companies, health insurance companies, management consultants, and architectural and construction firms. PhD's are employed in academic, research, and consulting environments.

MS DEGREE REQUIREMENTS

All students are required to take ISyE 417 Introduction to Health Systems Engineering. **Please note if you earn a grade of C or below in a course you CANNOT count that course toward the 30-credit requirement.**

Foundation Courses (6 cr. min)

- **ISyE 517:** Decision Making in Healthcare
- **ISyE 601:** Stochastic Models in Production and Healthcare Systems
- **ISyE 617:** Health Information Systems
- **Quality and Safety:** ISyE 555 or 559 or 608 or 703

Statistics and Research Methods (6 cr. min)

- **ISyE 601:** Special topics in ISyE (topics vary by semester)
- **EdPsych 711:** Hierarchical Linear Modeling
- **EdPsych 862:** Multivariate Analysis
- **Psych 610:** Statistical Analysis of Psychological Experiments
- **Psych 710:** Multiple Regression
- **Stat 333:** Applied Regression Analysis
- **Stat 424*:** Statistical Experimental Design for Engineers
- **Stat 571:** Statistics for Biostatistics
- **Stat 641:** Statistical methods for clinical trials
- **Stat 701:** Applied Time Series Analysis, Forecasting and Control I

ISyE Tools (6 cr. min)

- **ISyE 513:** Capital Investment Analysis
- **ISyE 515:** Engr Management
- **ISyE 516:** Introduction to Decision Analysis
- **ISyE 601:** ******(e.g., Special Topics: Long Term Care)⁽¹⁾
- **ISyE 620:** Discrete Event Simulation
- **ISyE 624:** Stochastic Modeling
- **ISyE 633:** Queuing Theory
- **ISyE 652:** Sociotechnical Systems
- **ISyE 653:** Job and Organizational Design
- **ISyE 662:** Design and Human Disability and Aging
- **ISyE 723:** Dynamic Programming
- **ISyE 729:** Behavioral Analysis of Management Decision Making
- **ISyE 816:** Special Topics in Ind Engr ⁽¹⁾

⁽¹⁾Topic must be approved in advance by advisor.

Concentration Area (6 cr. min in one area)

1) Area 1: Health Outcomes & Evaluation

- **Nurs 761:** Health Program Planning, Evaluation & Quality Improvement
- **PHS 797:** Introduction to Epidemiology
- **PHS 875:** Assessment of Medical Technologies
- **PHS 876:** Measuring Health Outcomes

2) Area 2: Quality/Safety

- **ISyE 555:** Human Performance and Accident Causation
- **ISyE 559:** Patient Safety and Error Reduction in Healthcare
- **ISyE 575*:** Introduction to Quality Engineering
- **ISyE 608:** Safety and Quality in the Medication Use Systems
- **ISyE 703:** Quality of Health Care: Evaluation and Assurance
- **ISyE 854:** Safety Theory (offered occasionally)

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

3) Area 3: Production Processes in Health Care

- **ISyE 515:** Engr Management
- **ISyE 601:** Special topics in ISyE (topics vary by semester)
- **ISyE 615:** Production Systems Control
- **ISyE 643:** Performance Analysis of Manufacturing Systems
- **OTM 753:** Health Care Management Operations

4) Area 4: Informatics

- **ISyE 575*:** Introduction to Quality Engineering
- **ISyE 617:** Health Information Systems
- **ISyE 671:** E-Business: Technologies, Strategies and Applications
- **BMI 576:** Introduction to Bioinformatics
- **BMI 773:** Clinical Research Informatics
- **BMI 776:** Advanced Bioinformatics

Electives (6 cr.)

Any of the courses in the concentration areas. Other courses must be approved (in writing) in advance 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.
- No grade of C or below for any course.
- 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.

HEALTH SYSTEMS LABS & CENTERS

- **Center for Quality and Productivity Improvement (CQPI)**
- **Center for Health Systems Research and Analysis (CHSRA)**
- **Center for Health Enhancement and Social Support (CHESS)**
- **Health Systems Laboratory**
- **Sociotechnical Engineering Laboratory**
- **Living Environments Laboratory in the Wisconsin Institute for Discovery**
- **Wisconsin Institute for Healthcare Systems Engineering**

JOB PLACEMENT

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

3182 Mechanical Engineering
1513 University Avenue
Madison, WI 53706
Tel: (608) 263-4025
Fax: (608) 890-2204
Email: iegradadmission@engr.wisc.edu
<http://www.engr.wisc.edu/ie>

