HEALTH SYSTEMS ENGINEERING

Department of Industrial and Systems Engineering
UNIVERSITY OF WISCONSIN–MADISON

CORE FACULTY
O. Alagoz, 3025 ME, 608-890-0399
P. Brennan, 3021 ME, 608-263-1315
P. Carayon, 3130 ECB, 608-262-9797
E. Mendonça, H6/550 CSC, 600 Highland Ave., Madison, WI 53792-4675

AFFILIATE FACULTY
Jingshan Li, 3222 ME, 608-890-3780
Raj Veeramani, 4101 ME, 608-262-0861
Rob Radwin, 2106 ME, 608-263-6596
Doug Wiegman, 3214 ME, 608-890-1932
J. Beasley, Verona Clinic, 608-263-7373
M. Carnes, 700 Regent St., 608-263-9770
C. Crinich
J. M. Robinson, 1187 WARF, 608-263-4890
M. Sesto, 5110 MSC, 608-263-5697
L. Steege, Box 2455 CSC, 608-263-5191
B. Tomadsen, B1143 WIMR, 608-263-4183
D. Vanness, 785 WARF, 608-265-8600
D. Zimmerman, 1163 WARF, 608-263-4875

ADMISSION NOTICE
The foundation courses for this degree program are offered both fall 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 17% 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
Required of all students ISyE 417 Introduction to Health Systems Engineering.

FOUNDATION COURSES (6 cr min)
ISyE 517 Decision Making in Health Care
ISyE 610 Design of Program Evaluation Systems (offered occasionally)
ISyE 617 Health Information Systems Quality and Safety: ISyE 555 or 559 or 608 or 703

STATISTICS AND RESEARCH METHODS (6 cr min)
EdPsych 711 Hierarchical Linear Modeling
EdPsych 862 Multivariate Analysis
### MS Degree Requirements

#### ISyE Tools (6 cr min)
- ISyE 513: Capital Investment Analysis
- ISyE 515: Engr Management
- ISyE 516: Introduction to Decision Analysis
- ISyE 620: Discrete Event Simulation
- ISyE 624: Stochastic Modeling
- ISyE 633: Queuing Theory
- ISyE 652: Sociotechnical Systems Design
- ISyE 653: Job and Organizational Design
- ISyE 662: Design and Human Disability and Aging
- ISyE 691: **(e.g., Special Topics: Long Term Care)\(^{(1)}\)
- 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 1 area)

**AREA 1: Health Outcomes & Evaluation**
- Nurs 761: Health Program Planning,
  - Psych 610: Statistical Analysis of Psychological Experiments
  - Stat 333: Applied Regression Analysis
  - Stat 424: Statistical Experimental Design for Engineers
  - Stat 541: Introduction to Biostatistics
  - Stat 701: Applied Time Series Analysis, Forecasting and Control

**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 System
- ISyE 703: Quality of Health Care: Evaluation and Assurance
- ISyE 854: Safety Theory (offered occasionally)

**AREA 3: Production Processes in Health Care**
- ISyE 515: Engr Management
- ISyE 615: Production Systems Control
- ISyE 643: Performance Analysis of Manufacturing Systems
- ISyE 691: Stochastic Models for Production and Health Care System
- OTM 765: Health Care Management Operations

**AREA 4: Informatics**
- ISyE 575: Introduction to Quality Engineering
- ISyE 617: Health Information Systems
- ISyE 671: E-Business: Technologies

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**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 Requirement
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.

#### Health Systems Labs & Centers
- Center for Quality and Productivity Improvement
- Center for Health Systems Research and Analysis
- CHESS Center for Health Enhancement and Social Support
- Health Systems Laboratory
- Sociotechnical Engineering Laboratory
- Living Environments Laboratory in the Wisconsin Institute for Discovery