HEALTH SYSTEMS ENGINEERING

CORE FACULTY
O. Alagoz, 3025 ME, (608) 890-0399
P. Carayon, 3130 ECB, (608) 262-9797
J. Li 3222 ME, (608) 890-3780
N. Werner, 3021 ME, (608) 890-2578

AFFILIATE FACULTY
R. Veeramani, 4101 ME, (608) 262-0861
R. Radwin, 2106 ME, (608) 263-6596
D. Wiegmann, 3214 ME, (608) 890-1932
J. Beasley, Verona Clinic, (608) 263-7373
M. Carnes, 700 Regent St., (608) 263-9770
E. Mendonça, Health Innovation Program, (608) 262-1301
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) 265-8600
D. Vanness, 785 WARF, (608) 265-8600

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.

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 Health Care
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)
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 601 Fundamentals of Industrial Data Analytics

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. PhDs are employed in academic, research, and consulting environments.
MS DEGREE REQUIREMENTS
Continued

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
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 one area)

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

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)

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 763 Health Care Management Operations

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 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 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.

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

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