INDUSTRIAL ENGINEERING, PH.D.

The Department of Industrial and Systems Engineering offers opportunities for graduate study leading to the master of science and the doctor of philosophy degrees in industrial engineering. Five areas of specialization are available, each designed to produce graduates capable of leading new and developing areas within industrial and systems engineering. The five areas, each with its own courses of study and admission procedures, are: decision science/operations research, health systems, human factors and ergonomics, manufacturing and production systems, and quality engineering. Since each area offers faculty, research, and courses that are unique, both with respect to each other and to much of industrial and systems engineering taught elsewhere, it is advisable to see Graduate Program (https://www.engr.wisc.edu/academics/graduate-academics) on the department website for further information.

The specialization in decision science/operations research trains students in analytical methodologies useful for solving decision problems, especially problems that involve the allocation of sparse resources. Graduate study focuses on applied probability and statistics, decision analysis, optimization modeling, and optimization algorithms.

The health systems specialization seeks to train students to look at broad issues in health care, including long-term care, prevention, quality improvement, health care financing, and system evaluation. Understanding how people solve problems is a basic requirement for health systems engineers, who must apply scientific methods in a value-laden setting.

The specialization in human factors and ergonomics is concerned with the quality of work lives, ergonomics, and occupational safety and health for both workers and management. By examining, designing, testing, and evaluating the workplace and how people interact within it, human systems engineers can create productive, safe, and satisfying work environments.

The specialization in manufacturing and production systems is intended to provide the skills and knowledge necessary to compete successfully in a manufacturing environment. These skills include knowledge of the theory of manufacturing materials and processes and their control; knowledge of the essentials of manufacturing systems design and analysis; and knowledge of and hands-on experience with modern manufacturing technology.

The quality engineering specialization is designed to provide the necessary background for quality engineering careers in industry or government. Emphasis is on the foundations of quality improvement, job and organizational design, and process control.

REQUIREMENTS

MINIMUM DEGREE REQUIREMENTS AND SATISFACTORY PROGRESS
To make progress toward a graduate degree, students must meet the Graduate School Minimum Degree Requirements and Satisfactory Progress (http://guide.wisc.edu/graduate/#policiesandrequirementstext) in addition to the requirements of the program.

DOCTORAL DEGREES
Ph.D.

MINIMUM GRADUATE DEGREE CREDIT REQUIREMENT
51 credits

MINIMUM GRADUATE RESIDENCE CREDIT REQUIREMENT
32 credits

MINIMUM GRADUATE COURSEWORK (50%) REQUIREMENT
Half of degree coursework (26 credits out of 51 total credits) must be completed in graduate-level coursework; courses with the Graduate Level Coursework attribute are identified and searchable in the university’s Course Guide (http://my.wisc.edu/CourseGuideRedirect/BrowseByTitle).

PRIOR COURSEWORK REQUIREMENTS: GRADUATE WORK FROM OTHER INSTITUTIONS
Not allowed for graduate residence credit requirement but allowed for graduate degree credit requirement and graduate coursework (50%) requirement. Coursework earned ten or more years prior to admission to a doctoral degree is not allowed to satisfy requirements.

PRIOR COURSEWORK REQUIREMENTS: UW–MADISON UNDERGRADUATE
Not allowed for graduate residence credit requirement but allowed up to 6 credits numbered 300 level or above toward the graduate degree credit requirement but not toward the 50% graduate coursework except for 700 level or above courses. Coursework earned ten or more years prior to admission to a doctoral degree is not allowed to satisfy requirements.

PRIOR COURSEWORK REQUIREMENTS: UW–MADISON UNIVERSITY SPECIAL
Allowed up to 15 credits numbered 300 or above toward graduate residence credit requirement and graduate degree credit requirement. If the courses were numbered 700 or above they may count toward the minimum graduate coursework (50%) requirement. Coursework earned ten or more years prior to admission to a doctoral degree is not allowed to satisfy requirements.

CREDITS PER TERM ALLOWED
12 credits

PROGRAM-SPECIFIC COURSES REQUIRED
No program-specific courses required.
DOCTORAL MINOR/BREADTH REQUIREMENTS
All doctoral ISyE students are required to complete a minor.

In addition to requirement of minor, the Ph.D. program of ISyE has a requirement on breadth to make the Ph.D. student achieve minimum competence in multiple areas within industrial and systems engineering. It consists of taking at least two courses (6 credits) from a list of ISyE courses and attaining a grade of B or above in both courses.

OVERALL GRADUATE GPA REQUIREMENT
3.0

OTHER GRADE REQUIREMENTS
Grades of C and D received by a candidate in any graduate course will not be counted as credit toward the degree. These grades will be counted in the graduate GPA.

PROBATION POLICY
Students who are admitted with deficiencies but do not complete these courses within the first year are subject to probation.

ADVISOR
Every graduate student is required to have an advisor. To ensure that students are making satisfactory progress toward a degree, the Graduate School expects them to meet with their advisor on a regular basis.

An advisor generally serves as the thesis advisor. In many cases, an advisor is assigned to incoming students. Students can be suspended from the Graduate School if they do not have an advisor. An advisor is a faculty member, or sometimes a committee, from the major department responsible for providing advice regarding graduate studies.

A committee often accomplishes advising for the students in the early stages of their studies.

In addition to the Graduate School policies, two faculty members must be from ISyE.

ASSESSMENTS AND EXAMINATIONS
Examinations: qualifying exam, preliminary exam, and final oral defense.

Doctoral students are required to take a comprehensive preliminary/oral examination after they have cleared their record of all Incomplete and Progress grades (other than research and thesis). Deposit of the doctoral dissertation in the Graduate School is required.

TIME CONSTRAINTS
The qualifying examination requirement must be satisfied by the end of the seventh semester of enrollment after earning the M.S. in Industrial Engineering or its equivalent from any institution.

The preliminary exam must be taken within five years after the time of passing the qualifying exam.

The Ph.D. defense must be completed within five years after passing the preliminary examination.

Doctoral degree students who have been absent for ten or more consecutive years lose all credits that they have earned before their absence. Individual programs may count the coursework students completed prior to their absence for meeting program requirements; that coursework may not count toward Graduate School credit requirements.

LANGUAGE REQUIREMENTS
No language requirements.

ADMISSIONS

Although an undergraduate industrial engineering degree is recommended, students from any discipline with a strong quantitative science emphasis are encouraged to apply. Applicants are strongly advised to review the prerequisites for each area of specialization at the department website (https://www.engr.wisc.edu/academics/graduate-academics).

Each application is judged on the basis of previous academic record, Graduate Record Exam (GRE) scores for the general test, three letters of recommendation, and the statement of purpose. Admission is very competitive and application deadlines are extremely important.

LEARNING OUTCOMES

KNOWLEDGE AND SKILLS
• Articulates research problems, potentials, and limits with respect to theory, knowledge, or practice within industrial and systems engineering.
• Formulates ideas, concepts, designs, and/or techniques beyond the current boundaries of knowledge within the industrial and systems engineering.
• Creates research, scholarship, or performance that makes a substantive contribution to the industrial and systems engineering field.
• Demonstrates breadth within their learning experiences.
• Advances contributions of the field of industrial and systems engineering to society.
• Communicates complex ideas in a clear and understandable manner to variety of audience.

PROFESSIONAL CONDUCT
• Fosters ethical and professional conduct.

PEOPLE

Faculty: Professors Bier (chair), Brennan, Carayon, Lee, Li, Linderoth, Radwin, Shi, Vanderheiden, Veeramani, Zhou; Associate Professors Alagoz, Krishnamurthy, Li, Luedtke, McLay, Wiegmann; Assistant Professors: Del Pia, Liu, Wang, Werner; Affiliate Professors Bowers, Burnside, Carnes, DeCroix, Ferris, Greenberg, Finster, Maravelias, Noyce, Pugh, Qian, Sesto, Shah, Smith, Steege, Thomadsen, Vanness, Wright