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 and systems engineering.

In the Ph.D. program, four areas of specialization are available, each designed to produce graduates capable of leading new and developing areas within industrial and systems engineering. The four areas are: 
- Decision science/operations research
- Health systems
- Human factors and ergonomics
- Manufacturing and production systems

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

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 department also offers three distinct master of science programs. The Master of Science in Industrial Engineering (http://guide.wisc.edu/graduate/industrial-systems-engineering/industrial-engineering-ms) with no named option is a research program designed for students wishing to conduct research during their program. The two course-based named option programs in the MS-IE, Human Factors and Systems Engineering M.S. (http://guide.wisc.edu/graduate/industrial-systems-engineering/industrial-engineering-ms/industrial-engineering-human-factors-health-systems-engineering-ms) and Systems Engineering and Analytics M.S. (http://guide.wisc.edu/graduate/industrial-systems-engineering/industrial-engineering-ms/industrial-engineering-systems-engineering-analytics-ms), are accelerated programs that can be completed in one full year of study and are designed for students wishing to pursue a career in industry or government.

The department also offers a graduate/professional certificate in Patient Safety (http://guide.wisc.edu/graduate/industrial-systems-engineering/patient-safety-graduate-professional-certificate). This certificate is an interdisciplinary effort between the Department of Industrial and Systems Engineering, School of Nursing, School of Pharmacy, Department of Medical Physics, and Department of Population Health Sciences.

ADMISSIONS

GRADUATE SCHOOL ADMISSIONS

Graduate admissions is a two-step process between academic degree programs and the Graduate School. Applicants must meet requirements of both the program(s) and the Graduate School. Once you have researched the graduate program(s) you are interested in, apply online (https://grad.wisc.edu/admissions).

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall Deadline</td>
<td>December 15</td>
</tr>
<tr>
<td>Spring Deadline</td>
<td>October 1</td>
</tr>
<tr>
<td>Summer Deadline</td>
<td>December 15</td>
</tr>
<tr>
<td>GRE (Graduate Record Examinations)</td>
<td>Required.</td>
</tr>
<tr>
<td>English Proficiency Test</td>
<td>Every applicant whose native language is not English or whose undergraduate instruction was not in English must provide an English proficiency test score and meet the Graduate School minimum requirements (<a href="https://grad.wisc.edu/apply/requirements/english-proficiency">https://grad.wisc.edu/apply/requirements/english-proficiency</a>).</td>
</tr>
<tr>
<td>Other Test(s) (e.g., GMAT, MCAT)</td>
<td>n/a</td>
</tr>
<tr>
<td>Letters of Recommendation</td>
<td>3</td>
</tr>
</tbody>
</table>

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.

APPLICATION DEADLINES:

- **Fall:** Dec. 15th
- **Spring:** Oct. 1st
- **Summer:** Dec. 15th

Reentry applicants: July 15 (fall), December 1 (spring), and must notify an academic advisor.

Additional reentry information (https://grad.wisc.edu/admissions/previouslyenrolled)

Note: Although we accept summer applications we recommend applying for fall or spring as there are not many courses offered in the summer.
APPLICATION REQUIREMENTS

Application deadlines are strictly enforced and ALL application materials including transcripts, GRE and TOEFL scores MUST be included and submitted by the application deadline.

*Please note our office does not provide feedback to applicants as to their potential for admission - please review both the ISyE department and Graduate School requirements for admission and if you feel you meet the necessary criteria for applying, please do so.

1. Applicants must first meet all of the requirement of the Graduate School. Click here for more information about these requirements (http://grad.wisc.edu/admissions/requirements).
2. Applicants must also meet department specific requirements as outlined below:
   • B.S. degree or equivalent

APPLICATION STEPS

1. Fill out an online application (https://grad.wisc.edu/apply) through the Graduate School website and pay the application fee. (https://grad.wisc.edu/admissions/faq)
2. List three recommenders and their contact information as part of the online application. An email will be sent to the recommender, asking that they submit their letter online using the Graduate School’s recommendation form. Applicants can log back into their online application to re-send the email request if the recommender loses the email. Letters of recommendation must be submitted electronically.
3. Submit a Statement of Purpose (https://grad.wisc.edu/prospective/prepare/statement) with your online application.
4. TOEFL Exam Information: Ask ETS (https://www.ets.org) to submit your GRE and/or TOEFL scores to the UW–Madison Graduate School (Institution Number 1846). If you have your scores sent to UW–Madison, they will be available online to all departments to which you have applied. The institution code, therefore, is the only number needed. For more information please visit the Graduate School Requirements (https://grad.wisc.edu/admissions/requirements) page. Please note: Exam information must be valid at start date of the semester that you are applying for (nonexpired).
5. GRE Exam Information: (https://www.ets.org/gre) The IE graduate program requires the GRE exam be taken by prospective students as part of the application. Note there are no specific scoring guidelines for the exam as the GRE is only one part of consideration for admission into the program. Please note: Exam information must be valid at start date of the semester that you are applying for (nonexpired).
6. Electronically submit one copy of your official transcript with your application. Unofficial copies of transcripts will be accepted for review but official copies are required for admitted students.

NOTE: PLEASE DO NOT SEND MATERIALS/DOCUMENTS TO THE ISyE DEPARTMENT OR GRADUATE SCHOOL UNTIL YOU ARE RECOMMENDED FOR ADMISSIONS. ALL DOCUMENTS SHOULD BE UPLOADED WITH YOUR APPLICATION.

QUESTIONS?

Check out the Admissions FAQ or contact us at iegradadmission@engr.wisc.edu.

FUNDING

GRADUATE SCHOOL RESOURCES

Resources to help you afford graduate study might include assistantships, fellowships, traineeships, and financial aid. Further funding information (https://grad.wisc.edu/funding) is available from the Graduate School. Be sure to check with your program for individual policies and processes related to funding.

PROGRAM RESOURCES

FINANCIAL ASSISTANCE

Please note that most funding is available for Ph.D. students and there is limited resources for M.S. students. International students must prove one year of funding before requesting assistance.

If you choose to attend UW–Madison and plan to pursue funding on your own, the following sites could be very helpful:

• Graduate School Funding Resources (https://grad.wisc.edu/studentfunding/prospective)
• Graduate School Costs and Funding (https://grad.wisc.edu/studentfunding/currentstudents)
• Tuition & Fees (https://registrar.wisc.edu/tuition_fees.htm)

TO APPLY FOR TA OR GRADER POSITION

• Teaching Assistant (https://docs.google.com/forms/d/e/1FAIpQLSeT-Q1lSnemo4RBjJMNoqrohsFHpT77DoWiVVK8_ot-y1eye16Q/viewform?usp=sf_link)
• Grader (https://docs.google.com/a/wisc.edu/forms/d/e/1FAIpQLSeh-wQWWIXQp_y_GF_utRk9Tv-8Ly9-0LUU83xWRcsJiAGA/viewform)

Application Process:

Teaching assistant and grader positions are appointed each semester. New TAs must submit an application each semester in order to be considered. If you currently are a TA in Industrial and Systems Engineering, you do not need to complete an application each semester.

The number of positions is limited, and the application process is highly competitive. Priority is given to those with current positions who are in good standing and would like to continue teaching. Only after these positions are filled do we look at other applicants. The number of new positions available each semester is generally low, especially in the spring. While this should not deter you from applying, please keep it in mind when planning for the semester.

The department will consider graduate students from other departments only when there are no qualified applicants from the Department of Industrial and Systems Engineering.

Expected timing for appointments:

Appointments for teaching assistants are generally made in August for the fall semester and in early December for the spring semester. Grader appointments are appointed along a similar timeline, but often a few weeks later.

Once hired:
Students hired into a TA position are required to attend the New Educator Orientation (NAO) training in late August. For more details, please see this website [http://ceete.engr.wisc.edu/ta-training](http://ceete.engr.wisc.edu/ta-training).

**Speaking requirements for international students:**

All international students applying for teaching assistant positions must meet the UW–Madison Graduate School's requirement [https://www.google.com/url?q=https%3A%2F%2Fkb.wisc.edu%2Fpage.php%3Fid%3D3D25268%62sa=D&sntz=1&usg=AFQjCN6C8qLuuVuy9BuLQFUZtnKZMhBvA](https://www.google.com/url?q=https%3A%2F%2Fkb.wisc.edu%2Fpage.php%3Fid%3D3D25268%62sa=D&sntz=1&usg=AFQjCN6C8qLuuVuy9BuLQFUZtnKZMhBvA) for spoken English BEFORE they can be considered as a TA. This requirement can be fulfilled in two ways:

1. Pass the SPEAK ([https://esl.wisc.edu/ita-training/speak](https://esl.wisc.edu/ita-training/speak))—you can register for the SPEAK test through Aaron Webster in Room 3180 ME, aaron.webster@wisc.edu.
2. Receive a 26 or higher on the speaking portion of the TOEFL test (or equivalent). Provide a copy of your score to Aaron Webster in Room 3180 ME, aaron.webster@wisc.edu

### REQUIREMENTS

#### MINIMUM GRADUATE SCHOOL REQUIREMENTS

Review the Graduate School minimum academic progress and degree requirements [http://guide.wisc.edu/graduate/#policiesandrequirementstext](http://guide.wisc.edu/graduate/#policiesandrequirementstext), in addition to the program requirements listed below.

#### MAJOR REQUIREMENTS

### MODE OF INSTRUCTION

<table>
<thead>
<tr>
<th>Mode of Instruction</th>
<th>Face to Face</th>
<th>Evening/Weekend</th>
<th>Online</th>
<th>Hybrid</th>
<th>Accelerated</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

**Mode of Instruction Definitions**

**Evening/Weekend:** These programs are offered in an evening and/or weekend format to accommodate working schedules. Enjoy the advantages of on-campus courses and personal connections, while keeping your day job. For more information about the meeting schedule of a specific program, contact the program.

**Online:** These programs are offered primarily online. Many available online programs can be completed almost entirely online with all online programs offering at least 50 percent or more of the program work online. Some online programs have an on-campus component that is often designed to accommodate working schedules. Take advantage of the convenience of online learning while participating in a rich, interactive learning environment. For more information about the online nature of a specific program, contact the program.

**Hybrid:** These programs have innovative curricula that combine on-campus and online formats. Most hybrid programs are completed on-campus with a partial or completely online semester. For more information about the hybrid schedule of a specific program, contact the program.

**Accelerated:** These on-campus programs are offered in an accelerated format that allows you to complete your program in a condensed time-frame. Enjoy the advantages of on-campus courses with minimal disruption to your career. For more information about the accelerated nature of a specific program, contact the program.

### CURRICULAR REQUIREMENTS

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Detail</th>
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</thead>
<tbody>
<tr>
<td>Minimum Credit Requirement</td>
<td>51 credits</td>
</tr>
<tr>
<td>Minimum Residence Credit Requirement</td>
<td>32 credits</td>
</tr>
<tr>
<td>Minimum Graduate Coursework Requirement</td>
<td>Half of degree coursework (26 credits out of 51 total credits) must be completed graduate-level coursework; courses with the Graduate Level Coursework attribute are identified and searchable in the university's Course Guide.</td>
</tr>
<tr>
<td>Overall Graduate GPA Requirement</td>
<td>3.00 GPA required.</td>
</tr>
<tr>
<td>Other Grade Requirements</td>
<td>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.</td>
</tr>
</tbody>
</table>
Assessments and Examinations

Examinations: qualifying exam, preliminary exam, and final oral defense.

Qualifying Exam: Students must register for the ISyE Qualifying Exams for all focus areas by 4 p.m. on the first Friday of September. The ISyE Ph.D. qualifying examination is only offered once a year in September. The exam consists of two requirements: fulfilling student’s Focus Area Qualifying Exam and fulfilling the Breadth Course requirement.

Policy and Guidelines: Each student wishing to be a Ph.D. candidate in the ISyE department must select an area group and satisfy the Qualifying Examination Requirement in that area. The detailed reading list and exam format of each area group can be found at the department office. Students can change area groups without retaking the Qualifying Exam with the permission of their Ph.D. advisors.

Breadth Requirement: The breadth requirement is to make the Ph.D. student achieve minimum competence in multiple areas of 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. The courses selected by the student must be approved by the student’s advisor and must be in at least two areas that are different from the area group in which the student’s qualifying exam is taken.

Focus Areas: Qualifying exams are offered in the following focus areas and are written and graded by the area group. Exam: For students in Decision Science, Health systems, or Manufacturing & Production Systems, a written examination is given. For specific requirements, please see the ISyE Qualifying Exam (https://www.engr.wisc.edu/app/uploads/2016/01/Qualifying-Exam-Registration.pdf) information under the ISyE Program Requirements and the ISyE Qualifying Exam Policy (https://www.engr.wisc.edu/app/uploads/2016/02/Document-General-Policy-for-ISyE-Qualifying-Exams.pdf). Students in Human Factors must request a reading list from their advisor at least 6 months before taking the Qualifying Exam. They must then complete a take-home written exam and a 1-hour oral exam. For specific requirements, please see the Human Factors Qualifying Exam Policy (https://www.engr.wisc.edu/app/uploads/2016/05/Revised-PhD-Degree-Requirements-for-the-Human-Factors-and-Ergonomics-Specialties.pdf) and the ISyE Qualifying Exam Policy (https://www.engr.wisc.edu/app/uploads/2016/02/Document-General-Policy-for-ISyE-Qualifying-Exams.pdf).

Doctoral students are required to take a comprehensive preliminary exam (https://grad.wisc.edu/acadpolicy/?policy=preliminaryexaminations/oral examination (https://grad.wisc.edu/acadpolicy/?policy=finaloralexamination) 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.

Language Requirements

No language requirements.

Doctoral Minor/ Breadth Requirements

All doctoral students are required to complete a minor. The program also has additional breadth requirements:

The breadth requirement is to make sure the Ph.D. student achieves minimum competence in multiple areas of industrial and systems engineering. It consists of taking at least two courses (6 credits) outside of the student’s focus area. Students can choose from a select set of courses and must attain a grade of B or above in both courses. The courses selected by the student must be approved by the student’s advisor and must be in at least two areas that are different from the area group in which the student’s qualifying exam is taken. These courses must be completed before a Ph.D. student can request their Preliminary Warrant. Courses the student has taken before entering the Ph.D. program can be counted toward this breadth requirement, including courses taken as an undergraduate. Students should submit the course title and syllabus to the student services coordinator who will then seek approval from the chair of graduate affairs.

REQUIRED COURSES

Students choose one of the below research areas. The program recommends working with your faculty advisors to answer any questions and to form a plan of study.

Ph.D. Plan of Study

Research Areas: (https://www.engr.wisc.edudepartment/industrial-systems-engineering/research-in-industrial-systems-and-engineering)¹

- Decision Sciences and Operations Research
- Health Systems Engineering
- Human Factors and Ergonomics
- Manufacturing and Production Systems
- Quality Engineering

¹ These tracks are internal to the program and represent different pathways a student can follow to earn this degree. Track names do not appear in the Graduate School admissions application, and they will not appear on the transcript.

Decision Science/Operations Research Area

Courses Recommended for DS/OR Qualifying Exam:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>I SY E/COMP SCI/E C E 524</td>
<td>Introduction to Optimization</td>
<td>3</td>
</tr>
<tr>
<td>I SY E/COMP SCI/MATH/STAT 525</td>
<td>Linear Optimization</td>
<td>3</td>
</tr>
<tr>
<td>I SY E 620</td>
<td>Simulation Modeling and Analysis</td>
<td>3</td>
</tr>
<tr>
<td>I SY E 624</td>
<td>Stochastic Modeling Techniques</td>
<td>3</td>
</tr>
<tr>
<td>I SY E/MATH/OTM/STAT 632</td>
<td>Introduction to Stochastic Processes</td>
<td>3</td>
</tr>
<tr>
<td>I SY E/COMP SCI/MATH 728</td>
<td>Integer Optimization</td>
<td>3</td>
</tr>
</tbody>
</table>

Courses Recommended for Optimization Qualifying Exam:
<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>I SY/E COMP SCI/ECE 524</td>
<td>Introduction to Optimization</td>
<td>3</td>
</tr>
<tr>
<td>I SY/E COMP SCI/MATH/STAT 525</td>
<td>Linear Optimization</td>
<td>3</td>
</tr>
<tr>
<td>I SY/E COMP SCI/MATH/STAT 726</td>
<td>Nonlinear Optimization I</td>
<td>3</td>
</tr>
<tr>
<td>I SY/E COMP SCI/MATH 728</td>
<td>Integer Optimization</td>
<td>3</td>
</tr>
<tr>
<td>I SY/E COMP SCI/MATH 730</td>
<td>Nonlinear Optimization II</td>
<td>3</td>
</tr>
</tbody>
</table>

**Other Suggested Courses:**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>I SY/E COMP SCI/MATH/STAT 632</td>
<td>Introduction to Stochastic Processes</td>
<td>3</td>
</tr>
<tr>
<td>I SY/E 645</td>
<td>Engineering Models for Supply Chains</td>
<td>3</td>
</tr>
<tr>
<td>I SY/E COMP SCI 719</td>
<td>Stochastic Programming</td>
<td>3</td>
</tr>
<tr>
<td>I SY/E COMP SCI 723</td>
<td>Dynamic Programming and Associated Topics</td>
<td>3</td>
</tr>
<tr>
<td>I SY/E COMP SCI 727</td>
<td>Convex Analysis</td>
<td>3</td>
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</tbody>
</table>

**Health Systems Engineering Research Area**

**Highly Recommended Courses:**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>I SY/E COMP SCI/DS 518</td>
<td>Engineering Management of Continuous Process Improvement</td>
<td>3</td>
</tr>
<tr>
<td>I SY/E COMP SCI/DS 519</td>
<td>Introduction to Decision Analysis</td>
<td>3</td>
</tr>
<tr>
<td>I SY/E COMP SCI/DS 520</td>
<td>Introduction to Quality Engineering</td>
<td>3</td>
</tr>
<tr>
<td>I SY/E/PHARMACY 608</td>
<td>Safety and Quality in the Medication Use System</td>
<td>3</td>
</tr>
<tr>
<td>I SY/E 615</td>
<td>Production Systems Control</td>
<td>3</td>
</tr>
<tr>
<td>I SY/E 620</td>
<td>Simulation Modeling and Analysis</td>
<td>3</td>
</tr>
<tr>
<td>I SY/E 624</td>
<td>Stochastic Modeling Techniques</td>
<td>3</td>
</tr>
<tr>
<td>I SY/E/M E 643</td>
<td>Performance Analysis of Manufacturing Systems</td>
<td>3</td>
</tr>
<tr>
<td>I SY/E/PSYCH 652</td>
<td>Sociotechnical Systems</td>
<td>3</td>
</tr>
<tr>
<td>I SY/E/PSYCH 653</td>
<td>Organization and Job Design</td>
<td>3</td>
</tr>
<tr>
<td>I SY/E/M HR 729</td>
<td>Behavioral Analysis of Management Decision Making</td>
<td>3</td>
</tr>
<tr>
<td>I SY/E 555</td>
<td>Human Performance and Accident Causation</td>
<td>3</td>
</tr>
<tr>
<td>I SY/E POP HLTH 875</td>
<td>Cost Effectiveness Analysis in Health and Healthcare</td>
<td>3</td>
</tr>
<tr>
<td>B M I/COMP SCI 576</td>
<td>Introduction to Bioinformatics</td>
<td>3</td>
</tr>
<tr>
<td>B M I 773</td>
<td>Clinical Research Informatics</td>
<td>3</td>
</tr>
<tr>
<td>B M I/COMP SCI 776</td>
<td>Advanced Bioinformatics</td>
<td>3</td>
</tr>
</tbody>
</table>

**Other Suggested Courses:**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>I SY/E 412</td>
<td>Fundamentals of Industrial Data Analytics</td>
<td>3</td>
</tr>
<tr>
<td>I SY/E/M E 513</td>
<td>Analysis of Capital Investments</td>
<td>3</td>
</tr>
</tbody>
</table>
each student. The following are categories of "Tools and Methods": Research Methods, Statistics, Qualitative Research, Biomechanics Methods, and Psychology. Students can work with their faculty advisor for non-I SY E course work.

**Manufacturing and Production Systems Research Area**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>I SY E 412</td>
<td>Fundamentals of Industrial Data Analytics</td>
<td>3</td>
</tr>
<tr>
<td>I SY E 415</td>
<td>Introduction to Manufacturing Systems, Design and Analysis</td>
<td>3</td>
</tr>
<tr>
<td>I SY E/M E 510</td>
<td>Facilities Planning</td>
<td>3</td>
</tr>
<tr>
<td>I SY E/M E 512</td>
<td>Inspection, Quality Control and Reliability</td>
<td>3</td>
</tr>
<tr>
<td>I SY E/M E 513</td>
<td>Analysis of Capital Investments</td>
<td>3</td>
</tr>
<tr>
<td>I SY E 515</td>
<td>Engineering Management of Continuous Process Improvement</td>
<td>3</td>
</tr>
<tr>
<td>I SY E 575</td>
<td>Introduction to Quality Engineering</td>
<td>3</td>
</tr>
<tr>
<td>I SY E 601</td>
<td>Special Topics in Industrial Engineering</td>
<td>1-3</td>
</tr>
<tr>
<td>I SY E 605</td>
<td>Computer Integrated Manufacturing</td>
<td>3</td>
</tr>
<tr>
<td>I SY E 612</td>
<td>Information Sensing and Analysis for Manufacturing Processes</td>
<td>3</td>
</tr>
<tr>
<td>I SY E 615</td>
<td>Production Systems Control</td>
<td>3</td>
</tr>
<tr>
<td>I SY E/M E 641</td>
<td>Design and Analysis of Manufacturing Systems</td>
<td>3</td>
</tr>
<tr>
<td>I SY E/M E 643</td>
<td>Performance Analysis of Manufacturing Systems</td>
<td>3</td>
</tr>
<tr>
<td>I SY E 645</td>
<td>Engineering Models for Supply Chains</td>
<td>3</td>
</tr>
<tr>
<td>STAT/M E 424</td>
<td>Statistical Experimental Design</td>
<td>3</td>
</tr>
<tr>
<td>I SY E 816</td>
<td>Special Topics in Systems Design</td>
<td>1-3</td>
</tr>
<tr>
<td>I SY E 823</td>
<td>Special Topics in Operations Research</td>
<td>1-3</td>
</tr>
</tbody>
</table>

**Quality Engineering Research Area**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>I SY E 412</td>
<td>Fundamentals of Industrial Data Analytics</td>
<td>3</td>
</tr>
<tr>
<td>I SY E 417</td>
<td>Health Systems Engineering</td>
<td>3</td>
</tr>
<tr>
<td>I SY E/M E 512</td>
<td>Inspection, Quality Control and Reliability</td>
<td>3</td>
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<tr>
<td>I SY E/M E 513</td>
<td>Analysis of Capital Investments</td>
<td>3</td>
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<tr>
<td>I SY E 515</td>
<td>Engineering Management of Continuous Process Improvement</td>
<td>3</td>
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<tr>
<td>I SY E 520</td>
<td>Quality Assurance Systems</td>
<td>3</td>
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<tr>
<td>I SY E 575</td>
<td>Introduction to Quality Engineering</td>
<td>3</td>
</tr>
<tr>
<td>I SY E 601</td>
<td>Special Topics in Industrial Engineering</td>
<td>1-3</td>
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<tr>
<td>I SY E 610</td>
<td>Design of Program Evaluation Systems</td>
<td>3</td>
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<tr>
<td>I SY E 612</td>
<td>Information Sensing and Analysis for Manufacturing Processes</td>
<td>3</td>
</tr>
<tr>
<td>I SY E 620</td>
<td>Simulation Modeling and Analysis</td>
<td>3</td>
</tr>
<tr>
<td>I SY E/M E 641</td>
<td>Design and Analysis of Manufacturing Systems</td>
<td>3</td>
</tr>
</tbody>
</table>

**Policies**

**GRADUATE SCHOOL POLICIES**

The Graduate School's Academic Policies and Procedures (https://grad.wisc.edu/acadpolicy) provide essential information regarding general university policies. Program authority to set degree policies beyond the minimum required by the Graduate School lies with the degree program faculty. Policies set by the academic degree program can be found below.

**MAJOR-SPECIFIC POLICIES**

**GRADUATE PROGRAM HANDBOOK**

The Graduate Program Handbook (https://www.engr.wisc.edu/app/uploads/2016/02/ISYE_New_Grad_Handbook-12.pdf) is the repository for all of the program's policies and requirements.

**PRIOR COURSEWORK**

**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.

**UW–Madison Undergraduate**

Not allowed for graduate residence credit requirement for master's thesis option or the Ph.D. track but allowed up to 6 credits numbered 300 level or above toward the graduate degree credit requirement for master's course option tracks but not toward the 50% graduate coursework except for 700 level or above courses. Coursework earned five or more years prior to admission to a master's degree is not allowed to satisfy 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.

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

ADVISOR / COMMITTEE
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. When graduate students are admitted to the ISyE department, their advisor is either (a) the faculty person providing financial support, (b) the faculty who recommended their admission or (c) a faculty is assigned to them by the student services coordinator. Advisors are assigned according to a student’s chosen Focus Area.

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.

Changing advisors during the graduate program may be necessary due to changes in a student’s interests or changes in the funding sources for their support. Students should discuss an advisor change with the faculty in their interest area and request a change of advisor with the ISyE Student Services in Room 3182 in Mechanical Engineering Building.

Ph.D. Committee
A committee often accomplishes advising for the students in the early stages of their studies. Attainment of a Ph.D. degree requires the preparation of a thesis on a research topic selected by the student and their advisor. Once a research project is selected, the student must choose his or her thesis committee. The thesis committee for the ISyE Ph.D. graduate program shall consist of at least five members (all are readers), including: the committee chair (the student's primary advisor). The committee chair must be an ISyE faculty. Emeritus faculty cannot serve as the committee chair. Four other graduate faculty members or former UWMadison graduate faculty members up to one year after resignation or retirement. At least one of the members of the committee must be from outside the Department of Industrial and Systems Engineering. The fifth member of the committee, as well as any additional members, may be from any of the following categories: graduate faculty, faculty from a department without a graduate program, academic staff (including emeritus faculty), visiting faculty, faculty from other institutions, scientists, research associates, and other individuals deemed qualified by the executive committee (or its equivalent).

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

CREDITS PER TERM ALLOWED
Enrollment of 12 credits or less recommended. (Full time status considered 8-12 credits).

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.

OTHER
n/a

PROFESSIONAL DEVELOPMENT

GRADUATE SCHOOL RESOURCES
Take advantage of the Graduate School's professional development resources (https://grad.wisc.edu/pd) to build skills, thrive academically, and launch your career.

PROGRAM RESOURCES

THE INDIVIDUAL DEVELOPMENT PLAN (HTTPS://GRAD.WISC.EDU/PD/IPD)
An Individual Development Plan helps with self-assessment, planning, and communication:

• An IDP can help you communicate your professional development and career planning needs and intentions to others including your mentor, which can lead to helpful advice and resources.
• You can use the IDP to make sure you and your mentor’s expectations are clearly outlined and in agreement so that there are no big surprises, particularly at the end of your training.
• The current job market is challenging and research has shown that individuals who perform structured career planning achieve greater career success and satisfaction.

The onus to engage in the IDP process is on you – although your mentor, PI, or others may encourage and support you in doing so. The IDP itself remains private to you, and you choose which parts to share with which mentors. Through the IDP process, you may decide to identify various mentors to whom you can go for expertise and advice.

ENGINEERING CAREER SERVICES (HTTPS://ECS.WISC.EDU)
Julie Rae, Assistant Director for Graduate Student Career Services

Assistant Director for Graduate Student Career Services
GRADUATE students in all Engineering programs

- Resumes & Cover Letters  https://ecs.wisc.edu/students/resumes-and-cover-letters/
- Job Search Strategies
- Job Offers & Negotiation  https://ecs.wisc.edu/students/offers-and-negotiation/
- CPT for Graduate Students  https://ecs.wisc.edu/students/co-op-and-internship/
- Student appointments: Click Here (http://go.wisc.edu/ecs-grad-appt) to schedule an appointment with ECS.


UW WRITING CENTER (HTTP://WRITING.WISC.EDU)

Location: 6171 Helen C. White Hall
Tel: (608) 263-1992

The UW Writing Center provides free of charge face-to-face and online consultations that focus on a number of different writing scenarios (i.e. drafts of course papers, resumes, reports, application essays, cover letters, theses, etc). Writing Center instructors will not edit or proofread drafts of course papers, resumes, reports, application essays, cover letters, theses, etc). Instead, their goal is to teach students to edit and proofread on their own in order to become a better, more confident writer.

LEARNING OUTCOMES

1. Articulates research problems, potentials, and limits with respect to theory, knowledge, or practice within industrial and systems engineering.
2. Formulates ideas, concepts, designs, and/or techniques beyond the current boundaries of knowledge within the industrial and systems engineering.
3. Creates research, scholarship, or performance that makes a substantive contribution to the industrial and systems engineering field.
4. Demonstrates breadth within their learning experiences.
5. Advances contributions of the field of industrial and systems engineering to society.
6. Communicates complex ideas in a clear and understandable manner to variety of audience.
7. Fosters ethical and professional conduct.

People

Faculty Directory

FACULTY

PROFESSORS

- Oguzhan Alagoz (https://directory.engr.wisc.edu/ie/Faculty/Alagoz_Oguzhan)
- Vicki Bier (https://directory.engr.wisc.edu/ie/Faculty/Bier_Vicki)
- Pascale Carayon (https://directory.engr.wisc.edu/ie/Faculty/Carayon_Pascale)
- Ananth Krishnamurthy (https://directory.engr.wisc.edu/ie/Faculty/Krishnamurthy_Ananth)
- John Lee (https://directory.engr.wisc.edu/ie/Faculty/Lee_John)
- Jingshan Li (https://directory.engr.wisc.edu/ie/Faculty/Li_Jingshan)
- Jeff Linderoth (https://directory.engr.wisc.edu/ie/Faculty/Linderoth_Jeffrey) (Department Chair)
- Robert Radwin (https://directory.engr.wisc.edu/ie/Faculty/Radwin_Robert)
- Leyuan Shi (https://directory.engr.wisc.edu/ie/Faculty/Shi_Leyuan)
- Raj Veeramani (https://directory.engr.wisc.edu/ie/Faculty/Veeramani_Raj)
- Shiyu Zhou (https://directory.engr.wisc.edu/ie/Faculty/Zhou_Shiyu)

ASSOCIATE PROFESSORS

- Laura Albert (https://directory.engr.wisc.edu/ie/Faculty/Albert-mclay_Laura)
- Jim Luedtke (https://directory.engr.wisc.edu/ie/Faculty/Luedtke_James)
- Doug Wiegmann (https://directory.engr.wisc.edu/ie/Faculty/Wiegmann_UpDown)

ASSISTANT PROFESSORS

- Alberto Del Pia (https://directory.engr.wisc.edu/ie/Faculty/Delpia_Alberto)
- Kaibo Liu (https://directory.engr.wisc.edu/ie/Faculty/Liu_Kaibo)
- Carla Michini (https://directory.engr.wisc.edu/ie/Faculty/Michini_Carla)
- Xin Wang (https://directory.engr.wisc.edu/ie/Faculty/Wang_Xin)
- Nicole Werner (https://directory.engr.wisc.edu/ie/Faculty/Werner_Nicole)
- Gabriel Zayas-Caban (https://directory.engr.wisc.edu/ie/Faculty/Zayas-caban_Gabriel)

AFFILIATE FACULTY

- Barbara Bowers (https://directory.engr.wisc.edu/ie/Faculty/Bowers_Barbara)
- Elizabeth S. Burnside (https://directory.engr.wisc.edu/ie/Faculty/Burnside_Elizabeth)
- Molly Carnes (https://directory.engr.wisc.edu/ie/Faculty/Carnes_Mary)
- Peter Chien (https://directory.engr.wisc.edu/ie/Faculty/Chien_Peter)
- Gregory DeCroix (https://directory.engr.wisc.edu/ie/Faculty/Decroix_Gregory)
- Michael Ferris (https://directory.engr.wisc.edu/ie/Faculty/Ferris_Michael)
- Caprice Greenberg (https://directory.engr.wisc.edu/ie/Faculty/Greenberg_Caprice)
- Po-ling Loh (https://directory.engr.wisc.edu/ce/ce/Faculty/Loh_Po-ling)
- Eneida Mendonca (https://directory.engr.wisc.edu/ie/Faculty/Mendonca_Eneida)
- Bilge Mutlu (https://directory.engr.wisc.edu/ie/Faculty/Mutlu_Bilge)
- David Noyce (https://directory.engr.wisc.edu/ce/Faculty/Noyce_David)
- Kevin Ponto (https://directory.engr.wisc.edu/ie/Faculty/Ponto_Keith)
- Carla Pugh (https://directory.engr.wisc.edu/ie/Faculty/Pugh_Carla)
• Andrew Quanbeck (https://directory. engr.wisc.edu/ie/Faculty/Quanbeck_Andrew)
• Thomas Rutherford (https://directory. engr.wisc.edu/ie/Faculty/Rutherford_Thomas)
• Nasia Safdar (https://directory. engr.wisc.edu/ie/Faculty/Safdar_Nasia)
• Mary Elizabeth Sesto (https://directory. engr.wisc.edu/bme/Faculty/Sesto_Mary)
• Dhavan V. Shah (https://directory. engr.wisc.edu/ie/Faculty/Shah_Dhavan)
• Maureen A. Smith (https://directory. engr.wisc.edu/ie/Faculty/Smith_Maureen)
• Linsey Steege (https://directory. engr.wisc.edu/ie/Faculty/Steege_Linsey)
• Bruce R. Thomadsen (https://directory. engr.wisc.edu/bme/Faculty/Thomadsen_Bruce)
• David J. Vanness (https://directory. engr.wisc.edu/ie/Faculty/Vanness_David)
• Rebecca Willett (https://directory. engr.wisc.edu/ece/Faculty/Willett_Rebecca)
• Stephen J. Wright (https://directory. engr.wisc.edu/ie/Faculty/Wright_Stephen)
• Victor Zavala (https://directory. engr.wisc.edu/che/Faculty/Zavala_Victor)

EMERITUS PROFESSORS

• John G. Bollinger (https://directory. engr.wisc.edu/ie/Faculty/Bollinger_John)
• Patricia Brennan (https://directory. engr.wisc.edu/ie/Faculty/Brennan_Patricia)
• Dennis G. Fryback (https://directory. engr.wisc.edu/ie/Faculty/Fryback_Dennis)
• David Gustafson (https://directory. engr.wisc.edu/ie/Faculty/Gustafson_David)
• William G. Reddan (https://directory. engr.wisc.edu/ie/Faculty/Reddan_William)
• Stephen M. Robinson (https://directory. engr.wisc.edu/ie/Faculty/Robinson_Stephen)
• Jerry L. Sanders (https://directory. engr.wisc.edu/ie/Faculty/Sanders_Jerry)
• Michael J. Smith (https://directory. engr.wisc.edu/ie/Faculty/Smith_Michael)
• Harold J. Steudel (https://directory. engr.wisc.edu/ie/Faculty/Steudel_Harold)
• Rajan Suri (https://directory. engr.wisc.edu/ie/Faculty/Suri_Rajan)
• Arne Thesen (https://directory. engr.wisc.edu/ie/Faculty/Thesen_Arne)
• Gregg Vanderheiden (https://directory. engr.wisc.edu/ie/Faculty/Vanderheiden_Gregg)
• David R. Zimmerman (https://directory. engr.wisc.edu/ie/Faculty/Zimmerman_David)