

INDUSTRIAL ENGINEERING, PHD

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 PhD 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, and manufacturing and production systems.

The specialization in operations research, optimization, and analytics 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 engineering 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 advanced manufacturing and industrial AI 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.

ADMISSIONS

ADMISSIONS

Please consult the table below for key information about this degree program's admissions requirements. The program may have more detailed admissions requirements, which can be found below the table or on the program's website.

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

Requirements	Detail
Fall Deadline	December 1
Spring Deadline	September 1

Summer Deadline	December 1
GRE (Graduate Record Examinations)	Required.
English Proficiency Test	Refer to the Graduate School: Minimum Requirements for Admission policy: (https://policy.wisc.edu/library/UW-1241) (https://policy.wisc.edu/library/UW-1241/)
Other Test(s) (e.g., GMAT, MCAT)	n/a
Letters of Recommendation Required	3

Applicants from any discipline that provides foundations for research in Industrial and Systems Engineering (ISyE) topics are encouraged to apply. For example, applicants may come from industrial, electrical, or mechanical engineering, or mathematics, statistics, computer science, psychology, or economics. Applicants are strongly advised to review the prerequisites for each area of specialization at the department website (<https://engineering.wisc.edu/programs/degrees/industrial-engineering-phd/>).

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.

REENTRY APPLICANTS

Reentry applicants must notify an academic advisor and apply by the following application deadlines for the appropriate term. Read more information about the additional reentry information (<https://grad.wisc.edu/admissions/previouslyenrolled/>).

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

- Fall: December 1
- Spring: September 1

APPLICATION REQUIREMENTS

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

*Note that our office does not provide feedback to applicants as to their potential for admission. Applicants should review both the Industrial and Systems Engineering (I SY E) 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 minimum requirements (<https://grad.wisc.edu/apply/requirements/>) of the Graduate School.
2. Applicants must also meet department specific requirements as outlined below:
 - a. BS degree or equivalent

APPLICATION STEPS

1. **Complete an online application (<https://grad.wisc.edu/apply/>) through the Graduate School website. (<https://grad.wisc.edu/admissions/faq/>)**

2. **List three recommenders and their contact information as part of the online application.**

- a. 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.**

- a. In this document, applicants should explain why they want to pursue further education in Industrial and Systems Engineering (ISyE) and discuss which UW faculty members they would be interested in doing research with during their graduate study.

4. **Submit test scores.**

- a. Request scores from ETS (<https://www.ets.org/>) to submit your GRE and/or TOEFL scores to the UW–Madison Graduate School (Institution Number 1846).
- b. 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.
- c. For more information, visit the **Graduate School Requirements (<https://grad.wisc.edu/admissions/requirements/>)** page. Note that exam information must be valid at start date of the semester that you are applying for (nonexpired).

5. **Submit GRE Exam information (<https://www.ets.org/gre/>).**

- a. The Industrial Engineering graduate program requires the GRE exam be taken by prospective students as part of the application. **Note that there are no specific scoring guidelines for the exam** as the GRE is only one part of consideration for admission into the program.
- b. Note that exam information must be valid at start date of the semester that you are applying for (nonexpired).

6. **Electronically submit one copy of your unofficial transcript with your application.**

- a. Official transcripts of all undergraduate and previous graduate work are required. Unofficial copies of transcripts will be accepted for review, but **official** copies are required for applicants recommended for admission.
- b. Do not send transcripts or any other application materials to the Graduate School or gradadmission@engr.wisc.edu.

7. **Upload your resume in your application.**

8. **Pay the Application Fee.**

- a. Submission must be accompanied by the one-time application fee. It is non-refundable and can be paid by credit card (MasterCard or VISA). By state law, this fee can only be waived or deferred through the conditions outlined here by the Graduate School. (<https://grad.wisc.edu/apply/fee-grant/>)

Do not send materials/documents to the Industrial and Systems Engineering (I SY E) Department or Graduate School until you are recommended for admissions. All documents should be uploaded with your application.

QUESTIONS

Check out the Admissions FAQ (<https://grad.wisc.edu/apply/>) or contact us at iegradadmission@engr.wisc.edu.

FUNDING

FUNDING

GRADUATE SCHOOL RESOURCES

The Bursar's Office provides information about tuition and fees associated with being a graduate student. Resources to help you afford graduate study might include assistantships, fellowships, traineeships, and financial aid. Further funding information is available from the Graduate School.

Be sure to check with your program for individual policies and restrictions related to funding.

FINANCIAL 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/>)

PROGRAM RESOURCES

Students admitted to the graduate program are provided financial support in the form of research assistantships, teaching assistantships, and fellowships. Support is dependent on availability of funds and students maintaining satisfactory progress towards their degree.

For information specific to graduate assistantships within the Department of Industrial and Systems Engineering, please consult the department's graduate program handbook (<https://engineering.wisc.edu/isye-grad-handbook/>).

ADDITIONAL RESOURCES

Federal Loans

Students who are U.S. citizens or permanent residents may be eligible to receive some level of funding through the federal direct loan program. These loans are available to qualified graduate students who are taking at least 4 credits during the fall and spring semesters, and 2 credits during summer. Private loans are also available. Learn more about UW–Madison financial aid here. (<https://financialaid.wisc.edu>)

International Student Services Funding and Scholarships

For information on international student funding and scholarships, visit the ISS website. (<https://iss.wisc.edu/students/new-students/funding-scholarships/>)

REQUIREMENTS

MINIMUM GRADUATE SCHOOL REQUIREMENTS

Review the Graduate School minimum degree requirements (<https://guide.wisc.edu/graduate/#requirementstext>) and policies (<https://guide.wisc.edu/graduate/#policiestext>), in addition to the program requirements listed below.

MAJOR REQUIREMENTS

MODE OF INSTRUCTION

Face to Face	Evening/ Weekend	Online	Hybrid	Accelerated
Yes	No	No	No	No

Mode of Instruction Definitions

Accelerated: Accelerated programs are offered at a fast pace that condenses the time to completion. Students typically take enough credits aimed at completing the program in a year or two.

Evening/Weekend: Courses meet on the UW–Madison campus only in evenings and/or on weekends to accommodate typical business schedules. Students have the advantages of face-to-face courses with the flexibility to keep work and other life commitments.

Face-to-Face: Courses typically meet during weekdays on the UW–Madison Campus.

Hybrid: These programs combine face-to-face and online learning formats. Contact the program for more specific information.

Online: These programs are offered 100% online. Some programs may require an on-campus orientation or residency experience, but the courses will be facilitated in an online format.

CURRICULAR REQUIREMENTS

Requirement Detail	
Minimum Credit Requirement	51 credits
Minimum Residence Credit Requirement	32 credits
Minimum Graduate Coursework Requirement	26 credits must be graduate-level coursework. Refer to the Graduate School: Minimum Graduate Coursework (50%) Requirement policy: https://policy.wisc.edu/library/UW-1244 (https://policy.wisc.edu/library/UW-1244/).
Overall Graduate GPA Requirement	3.00 GPA required. Refer to the Graduate School: Grade Point Average (GPA) Requirement policy: https://policy.wisc.edu/library/UW-1203 (https://policy.wisc.edu/library/UW-1203/).

Other Grade Requirements: Grades of D received by a candidate in any graduate course will not be counted as satisfying degree requirements. These grades will, however, be counted in the graduate GPA.

Students must earn a grade of B or above in all courses applied toward the program breadth requirement.

Students must earn a grade of C or better, or a grade of S (satisfactory) if taken on a pass/fail basis, in the colloquium/lecture series (I SY E 961).

Students in the Human Factors and Ergonomics pathway must receive a grade of AB or better in at least 3 credits in each of the following areas: cognitive ergonomics, sociotechnical systems/macro ergonomics, and physical ergonomics to take the qualifying exam. Refer to pathway for more information.

Assessments and Examinations	Qualifying exams, preliminary exams, and a final dissertation defense are required of all students. Details may be found in the program handbook.
Language Requirements	No language requirements.
Graduate School Breadth Requirement	All doctoral students are required to complete a doctoral minor or graduate/professional certificate. Refer to the Graduate School: Breadth Requirement in Doctoral Training policy: https://policy.wisc.edu/library/UW-1200 (https://policy.wisc.edu/library/UW-1200/).
	The program also has additional breadth requirements. See details below.

REQUIRED COURSES

Students choose one of the following Industrial and Systems Engineering (I SY E) research areas (<https://engineering.wisc.edu/departments/industrial-systems-engineering/research/>) for their PhD program, course and research planning in consultation with their faculty advisor.

All program PhD students must complete the following additional requirements.

Program Breadth

The breadth requirement is to make sure the PhD student achieves minimum competence in multiple areas of industrial and systems engineering. Students must take at least two courses (6 credits) in Methodology and two courses (6 credits) in Application areas selected by the student and approved by their advisor. Courses used to satisfy the breadth requirement must be completed by end of the semester the student is completing their preliminary examination. Prior coursework may be applied toward the breadth requirement (including courses taken as an undergraduate), but requires program approval and includes a review of the course title and syllabus.

Graduate School Breadth

Students must complete the Graduate School's breadth requirement by completing a cohesive group of courses outside of the major. These courses should help students in their research preparation. Students must consult their advisor before deciding how to fulfill this requirement.

Colloquium/Lecture Series

Students must enroll in I SY E 961 Graduate Seminar in Industrial Engineering for at least three semesters. The Industrial and Systems Engineering (ISyE) Colloquia and the Systems, Information, Learning and Optimization (SILO) seminars also satisfy this requirement.

Teaching Assistant

Recognizing the importance of instructional training to our PhD students, each student in the PhD program is required to serve as a teaching assistant for at least one semester during their program. Requests for a partial or full waiver of this requirement should be submitted in writing to the Associate Chair for Graduate Studies and will be reviewed by the Academic Affairs Cluster.

Code	Title	Credits
Research Area Pathway¹		
	Students complete a research area pathway (https://engineering.wisc.edu/departments/industrial-systems-engineering/research (https://engineering.wisc.edu/departments/industrial-systems-engineering/research/)) and plan of study chosen in consultation with advisor.	27
Program Breadth Requirement		
	Students must complete 12 credits of coursework in multiple areas of industrial and systems engineering, including 6 credits in methodology and 6 credits in application courses.	12
<i>Methodology</i>		
I SY E 313	Engineering Economic Analysis	
I SY E 320	Simulation and Probabilistic Modeling	
I SY E 323	Operations Research–Deterministic Modeling	
I SY E/ PSYCH 349	Introduction to Human Factors	
I SY E 412	Fundamentals of Industrial Data Analytics	
I SY E/COMP SCI/ MATH 425	Introduction to Combinatorial Optimization	
I SY E/M E 512	Inspection, Quality Control and Reliability	
I SY E 515	Engineering Management of Continuous Process Improvement	
I SY E 516	Introduction to Decision Analysis	
I SY E/COMP SCI/ DS 518	Wearable Technology	
I SY E 521	Machine Learning in Action for Industrial Engineers	
I SY E/COMP SCI/ E C E 524	Introduction to Optimization	
I SY E/COMP SCI/ MATH/STAT 525	Linear Optimization	
I SY E/ COMP SCI 526	Advanced Linear Programming	
I SY E/ PSYCH 549	Human Factors Engineering	
I SY E 552	Human Factors Engineering Design and Evaluation	

I SY E 555	Human Performance and Accident Causation
I SY E 562	Human Factors of Data Science and Machine Learning
I SY E/B M E 564	Occupational Ergonomics and Biomechanics
I SY E 575	Introduction to Quality Engineering
I SY E 602	Special Topics in Human Factors
I SY E 603	Special Topics in Engineering Analytics and Operations Research
I SY E 618	Quality Engineering and Quality Management
I SY E 620	Simulation Modeling and Analysis
I SY E 624	Stochastic Modeling Techniques
I SY E/MATH/ OTM/STAT 632	Introduction to Stochastic Processes
I SY E/ PSYCH 653	Organization and Job Design
I SY E/ COMP SCI 719	Stochastic Programming
I SY E/ INFO SYS 722	Computer-Based Data Management
I SY E/ COMP SCI 723	Dynamic Programming and Associated Topics
I SY E/COMP SCI/ MATH/STAT 726	Nonlinear Optimization I
I SY E/ COMP SCI 727	Convex Analysis
I SY E/COMP SCI/ MATH 730	Nonlinear Optimization II
<i>Application</i>	
I SY E 315	Production Planning and Control
I SY E 415	Introduction to Manufacturing Systems, Design and Analysis
I SY E 417	Health Systems Engineering
I SY E/M E 510	Facilities Planning
I SY E 517	Decision Making in Health Care
I SY E 520	Quality Assurance Systems
I SY E 557	Human Factors Engineering for Healthcare Systems
I SY E 604	Special Topics in Manufacturing and Supply Chain Management
I SY E 605	Computer Integrated Manufacturing
I SY E 606	Special Topics in Healthcare Systems Engineering
I SY E/ PHARMACY 608	Safety and Quality in the Medication Use System
I SY E 612	Information Sensing and Analysis for Manufacturing Processes
I SY E 615	Production Systems Control
I SY E/M E 641	Design and Analysis of Manufacturing Systems
I SY E/M E 643	Performance Analysis of Manufacturing Systems
I SY E/B M E 662	Design and Human Disability and Aging

ISY E/ POP HLTH 703	Quality of Health Care: Evaluation and Assurance
ISY E/M H R 729	Behavioral Analysis of Management Decision Making
ISY E/ POP HLTH 875	Cost Effectiveness Analysis in Health and Healthcare

Graduate School Breadth

Chosen in consultation with advisor, students must complete a cohesive group of courses outside of the major. This requirement must be completed by the end of the semester during which the preliminary exam is taken.¹

Colloquium/Lecture Series

Complete at least 3 semesters by the end of the semester the student is completing their preliminary examination.

ISY E 961	Graduate Seminar in Industrial Engineering
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Total Credits **51**

Operations Research, Optimization, and Analytics Pathway¹

The following is a list of recommended courses to prepare for the research area's qualifying examination.

Code	Title	Credits
Courses Recommended for DS/OR Qualifying Exam:		
ISY E/COMP SCI/ E C E 524	Introduction to Optimization	3
ISY E/COMP SCI/ MATH/STAT 525	Linear Optimization	3
ISY E 620	Simulation Modeling and Analysis	3
ISY E 624	Stochastic Modeling Techniques	3
ISY E/MATH/OTM/ STAT 632	Introduction to Stochastic Processes	3
ISY E/COMP SCI/ MATH 728	Integer Optimization	3

Courses Recommended for Optimization Qualifying Exam:

ISY E/COMP SCI/ E C E 524	Introduction to Optimization	3
ISY E/COMP SCI/ MATH/STAT 525	Linear Optimization	3
ISY E/COMP SCI/ MATH/STAT 726	Nonlinear Optimization I	3
ISY E/COMP SCI/ MATH 728	Integer Optimization	3
ISY E/COMP SCI/ MATH 730	Nonlinear Optimization II	3

The following is a list of suggested courses a student may choose to complete in this research area.

ISY E 412	Fundamentals of Industrial Data Analytics	3
ISY E/COMP SCI/ MATH 425	Introduction to Combinatorial Optimization	3
ISY E/M E 512	Inspection, Quality Control and Reliability	3
ISY E 516	Introduction to Decision Analysis	3
ISY E 517	Decision Making in Health Care	3

ISY E 575	Introduction to Quality Engineering	3
ISY E 603	Special Topics in Engineering Analytics and Operations Research	1-3
ISY E 604	Special Topics in Manufacturing and Supply Chain Management	1-3
ISY E 612	Information Sensing and Analysis for Manufacturing Processes	3
ISY E/MATH/OTM/ STAT 632	Introduction to Stochastic Processes	3
ISY E 645	Engineering Models for Supply Chains	3
ISY E 649	Interactive Data Analytics	3
ISY E/ COMP SCI 719	Stochastic Programming	3
ISY E/ COMP SCI 723	Dynamic Programming and Associated Topics	3
ISY E/ COMP SCI 727	Convex Analysis	3
ISY E 961	Graduate Seminar in Industrial Engineering	3

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

Health Systems Engineering Pathway¹

The following is a list of highly recommended courses to complete in this research area.

Code	Title	Credits
ISY E 417	Health Systems Engineering	3
ISY E 517	Decision Making in Health Care	3
ISY E 606	Special Topics in Healthcare Systems Engineering	1-3
ISY E/ POP HLTH 703	Quality of Health Care: Evaluation and Assurance	1-3

The following is a list of suggested courses a student may choose to complete in this research area.

ISY E 412	Fundamentals of Industrial Data Analytics	3
ISY E 415	Introduction to Manufacturing Systems, Design and Analysis	3
ISY E 521	Machine Learning in Action for Industrial Engineers	3
ISY E 555	Human Performance and Accident Causation	3
ISY E 575	Introduction to Quality Engineering	3
ISY E 601	Special Topics in Industrial Engineering ²	1-3
ISY E/ PHARMACY 608	Safety and Quality in the Medication Use System	3
ISY E 615	Production Systems Control	3
ISY E 620	Simulation Modeling and Analysis	3
ISY E 624	Stochastic Modeling Techniques	3
ISY E/M E 643	Performance Analysis of Manufacturing Systems	3

ISY E/M H R 729	Behavioral Analysis of Management Decision Making	3
ISY E/ POP HLTH 875	Cost Effectiveness Analysis in Health and Healthcare	3
B M I/ COMP SCI 576	Introduction to Bioinformatics	3
B M I 773	Clinical Research Informatics	3
B M I/ COMP SCI 776	Advanced Bioinformatics	3
ISY E 961	Graduate Seminar in Industrial Engineering	3

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

² Topics vary for this course. Obtain advance approval from your faculty advisor.

Advanced Manufacturing and Industrial AI Pathway¹

The following is a list of courses students may choose to complete in this research area.

Code	Title	Credits
Courses Recommended for Manufacturing Qualifying Exam:		
ISY E/M E 510	Facilities Planning	3
ISY E/M E 512	Inspection, Quality Control and Reliability	3
ISY E 605	Computer Integrated Manufacturing	3
ISY E 624	Stochastic Modeling Techniques	3
or ISY E/M E 643	Performance Analysis of Manufacturing Systems	
ISY E 604	Special Topics in Manufacturing and Supply Chain Management ²	3
or ISY E 645	Engineering Models for Supply Chains	
The following is a list of suggested courses a student may choose to complete in this research area.		
ISY E 412	Fundamentals of Industrial Data Analytics	3
ISY E 415	Introduction to Manufacturing Systems, Design and Analysis	3
ISY E 515	Engineering Management of Continuous Process Improvement	3
ISY E 575	Introduction to Quality Engineering	3
ISY E 601	Special Topics in Industrial Engineering ²	1-3
ISY E 603	Special Topics in Engineering Analytics and Operations Research ²	1-3
ISY E 612	Information Sensing and Analysis for Manufacturing Processes	3
ISY E 615	Production Systems Control	3
ISY E 620	Simulation Modeling and Analysis	3
ISY E/M E 641	Design and Analysis of Manufacturing Systems	3
ISY E 649	Interactive Data Analytics	3
ISY E/ COMP SCI 723	Dynamic Programming and Associated Topics	3

ISY E 823	Special Topics in Operations Research ²	1-3
ISY E 961	Graduate Seminar in Industrial Engineering	3

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

² Topics vary for this course. Obtain advance approval from your faculty advisor.

Human Factors and Ergonomics Pathway¹

Students in this research area must complete a depth requirement, which includes coursework and exam components. Students may use prior coursework to satisfy the coursework requirement to be eligible for the qualifying exam. HFE PhD students must complete an additional coursework and exam component.

Code	Title	Credits
The following is a list of suggested courses a student may choose to complete in this research area.		
ISY E/COMP SCI/ DS 518	Wearable Technology	3
ISY E 552	Human Factors Engineering Design and Evaluation	3
ISY E 555	Human Performance and Accident Causation	3
ISY E 562	Human Factors of Data Science and Machine Learning	3
ISY E/B M E 564	Occupational Ergonomics and Biomechanics	3
ISY E 601	Special Topics in Industrial Engineering ²	1-3
ISY E 602	Special Topics in Human Factors ²	3
ISY E/B M E 662	Design and Human Disability and Aging	3
ISY E 699	Advanced Independent Study ²	1-5
ISY E/PSYCH 854	Special Topics in Organization Design ²	1-3
ISY E/PSYCH 859	Special Topics in Human Factors Engineering ²	1-3
ISY E 961	Graduate Seminar in Industrial Engineering ²	3
CIV ENGR 679	Special Topics in Transportation and City Planning ²	3

Tools and Methods: Various courses in the categories of Research Methods, Statistics, Qualitative Research, Biomechanics Methods, and Psychology count as "Tools and Methods." The Human Factors and Ergonomics faculty group updates the list of "Tools and Methods" courses, and advisors decide which set of courses are appropriate for each student. Work with your faculty advisor regarding non-ISY E course work.

Human Factors and Ergonomics Course Requirement

Code	Title	Credits
To take the qualifying exam, a student will have to have received a grade of AB or better in at least 3 credits in each of the three areas below. Courses taken during undergraduate studies can be used to satisfy this requirement:		
Cognitive Ergonomics		
Students must complete one of the following courses.		3
I SY E 555	Human Performance and Accident Causation	
I SY E 601	Special Topics in Industrial Engineering ²	
I SY E 602	Special Topics in Human Factors ²	
I SY E 699	Advanced Independent Study ²	
I SY E/ PSYCH 859	Special Topics in Human Factors Engineering ²	
Sociotechnical Systems / Macroergonomics:		
Students must complete one of the following courses.		3
I SY E 555	Human Performance and Accident Causation	
I SY E/ PSYCH 653	Organization and Job Design ²	
I SY E 601	Special Topics in Industrial Engineering ²	
I SY E 602	Special Topics in Human Factors ²	
I SY E 699	Advanced Independent Study ²	
I SY E/ PSYCH 854	Special Topics in Organization Design ²	
Physical Ergonomics		
Students must complete one of the following courses.		3
I SY E 555	Human Performance and Accident Causation	
I SY E/B M E 564	Occupational Ergonomics and Biomechanics	
I SY E/B M E 662	Design and Human Disability and Aging	
I SY E 601	Special Topics in Industrial Engineering ²	
I SY E 602	Special Topics in Human Factors ²	
I SY E 699	Advanced Independent Study ²	
I SY E/ PSYCH 854	Special Topics in Organization Design ²	
Seminar / Special Topics in Human Factors		
Students must complete at least 12 credits of seminar or special topics courses numbered 700 or above, including 6 credits of in the Human Factors and Ergonomics area. Students may apply seminar courses to fulfill the program's breadth requirement if not Human Factors focused courses.		12

Prior to defending their dissertation, Human Factors and Ergonomics PhD students must complete at least six seminar/special topics courses numbered 700 or above totaling a minimum of 12 credits; at least 6 credits of these must be in the Human Factors and Ergonomics area. Seminar credits outside the Human Factors and Ergonomics area may be used to satisfy the Industrial Engineering Breadth requirement. Other courses may qualify. Students may submit courses to the Human Factors and Ergonomics Area group for consideration. Transfer students should submit a course syllabus or description and transcript for any courses from other institutions that they would like to have considered for satisfaction of this requirement. The Human Factors and Ergonomics Area group will make this decision.

I SY E 961	Graduate Seminar in Industrial Engineering	3
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¹ These pathways are internal to the program and represent different curricular paths a student can follow to earn this degree. Pathway names do not appear in the Graduate School admissions application, and they will not appear on the transcript.

² Topics vary for this course. Obtain advance approval from your faculty advisor.

POLICIES

GRADUATE SCHOOL POLICIES

The Graduate School's Academic Policies and Procedures (<https://grad.wisc.edu/acadpolicy/>) serve as the official document of record for Graduate School academic and administrative policies and procedures and are updated continuously. Note some policies redirect to entries in the official UW-Madison Policy Library (<https://policy.wisc.edu/>). Programs may set more stringent policies than the Graduate School. Policies set by the academic degree program can be found below.

MAJOR-SPECIFIC POLICIES

PRIOR COURSEWORK

Graduate Credits Earned at Other Institutions

Refer to the Graduate School: Transfer Credits for Prior Coursework (<https://policy.wisc.edu/library/UW-1216/>) policy.

Undergraduate Credits Earned at Other Institutions or UW-Madison

Credits are not allowed for the graduate residence credit requirement but students can transfer up to 6 credits from another institution or coursework numbered 300 or above from the undergraduate career completed at UW-Madison toward the graduate degree credit requirement. Transfer credits from other institutions must be equivalent to the rigor of UW-Madison courses numbered 300 and above. The 50% graduate coursework requirement can only be met by courses numbered 700 or above. Coursework earned ten or more years prior to admissions to a doctoral degree is not allowed to satisfy requirements.

Credits Earned as a Professional Student at UW-Madison (Law, Medicine, Pharmacy, and Veterinary careers)

Refer to the Graduate School: Transfer Credits for Prior Coursework (<https://policy.wisc.edu/library/UW-1216/>) policy.

Credits Earned as a University Special Student at UW-Madison

Refer to the Graduate School: Transfer Credits for Prior Coursework (<https://policy.wisc.edu/library/UW-1216/>) policy.

PROBATION

Criteria for Satisfactory Progress

- Cumulative and semester GPA of at least 3.0 are required. Thesis research grades must be P or S to be making satisfactory academic progress. The following courses are excluded from GPA calculations for this purpose: English for international students, courses numbered lower than 300 in any department, courses numbered 300 in the ISyE department.
- All students are admitted as full-time students unless otherwise noted in writing prior to the start of their program. Full-time students are expected to satisfy the Graduate School requirements for full-time status during all regular semesters in residence unless they have already passed the PhD preliminary examination. Students must have prior written approval from the academic affairs cluster to become part-time students. No special credit load requirements are imposed on approved part-time students.
- PhD students must complete qualifying exam, preliminary exam and final defense within the time constraints specified in the section above.
- PhD students are expected to make consistent progress toward their dissertation, appropriate for their year of study. Satisfactory research progress is determined by the PhD student's faculty advisor. Unsatisfactory progress will be communicated to the student by their faculty advisor, and can be done via the annual assessment of student progress, by giving the student a grade of "U" in a research course, or by a written letter.
- Graduate students are expected to meet academic and professional conduct standards, as described in the Industrial and Systems Engineering (ISyE) Graduate Handbook. This includes, but is not limited to, behaving in a professionally ethical manner, contributing to a positive work culture, and conducting research ethically.
- Graduate students with assistantship positions (RA, TA, or PA) must adequately perform the responsibilities associated with their position, as determined by the supervisor of the position.

Procedures in the case a student is not making satisfactory progress

- If a graduate student fails to meet satisfactory progress as defined by any of the criteria outlined above, a review committee will be formed to review the circumstances and the student's record, taking input from the student. The review committee will consist of the student's faculty advisor and two other Industrial and Systems Engineering (ISyE) faculty members appointed by the Associate Chair for Graduate Affairs.
- The review committee will review the student's record and determine if the student is making satisfactory progress. If the student is determined to not be making satisfactory progress, the committee will also decide whether the student should be placed on probation, or in exceptional cases (such as severe professional misconduct or academic misconduct as determined in accordance with UWS 14.04)

be immediately removed from the Industrial and Systems Engineering (ISyE) graduate program and have their funding guarantee removed. In case that a student is put on probation, the committee will provide the student with a written explanation of what is required in order for the probation to be lifted, and in what time frame the requirements must be met.

- Failure to qualify for removal from probation after being on probation for a semester will lead to the removal of a PhD student's funding guarantee.
- A request to appeal the review committee decision must be made by the student to the department chair within 10 days of receiving the decision. The appeal will be reviewed by the academic affairs cluster.

Probation

- The probationary status of each student will be reviewed at the end of each regular semester. A student placed on Probation who fails to qualify for removal of probation at the next review of his or her probationary status will not be permitted to continue graduate studies in the Industrial Engineering Department, and any funding guarantee made to the student by the department is removed.
- At the end of a semester when a student is on probation a committee will determine if the student is qualified for removal of probationary status. The committee will include the Associate Chair for Graduate affairs and two other faculty members appointed by the Associate Chair.

ADVISOR / COMMITTEE

Refer to the Graduate School: Advisor (<https://policy.wisc.edu/library/UW-1232/>) and Graduate School: Committees (Doctoral/Master's/MFA) (<https://policy.wisc.edu/library/UW-1201/>) policies.

Graduate students should always seek advice from their advisor prior to enrolling for courses.

Many PhD students are assigned a faculty advisor when they are admitted to the program, based on a match between their research interests and those of the assigned advisor. Some PhD students are not initially matched to a faculty advisor for their research when admitted. Such students are advised by the associate chair for graduate studies in their first year. During their first year, these students explore research possibilities with different faculty in the department and choose a faculty advisor by the end of the first year.

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 Industrial and Systems Engineering (ISyE) Student Services in Room 3182 in Mechanical Engineering Building.

PhD Committee

Attainment of a PhD 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 Industrial and Systems Engineering (ISyE) Graduate Program requires the thesis committee shall consist of at least four members for the Preliminary Exam Committee and at least four members for the Final Ph.D. Defense Committee including:

- The Committee Chair (the student's primary advisor). The Committee Chair must be an Industrial and Systems Engineering (ISyE) faculty. Emeritus faculty cannot serve as the Committee Chair.

- Three other graduate faculty members or former UW-Madison graduate faculty up to one year after resignation or retirement with two faculty members having their tenure home in Industrial and Systems Engineering (ISyE).
- All Committee members are required to be readers.
- The dissertation committee must consist of at least 4 members and meet the requirements set forth by the Graduate School, including for example, at least one of the members of the committee must be from a UW-Madison program outside the Industrial and Systems Engineering Department.
- Committee 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).

CREDITS PER TERM ALLOWED

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

TIME LIMITS

The qualifying examination requirement must be satisfied by the end of the fifth semester of enrollment after entering any UW-Industrial and Systems Engineering (ISyE) graduate program (including UW-Industrial and Systems Engineering (ISyE) masters' programs).

The preliminary exam must be completed within 4 years of entering any Industrial and Systems Engineering (ISyE) graduate program (including UW-Industrial and Systems Engineering (ISyE) masters' programs), and within 3 years of passing the qualifying exam.

The dissertation defense must be completed either within two years after passing the preliminary exam or by the end of the 6th year in the graduate program, whichever is later.

Exceptions to these time limits may be granted by the Academic Affairs Cluster through a petition process.

GRIEVANCES AND APPEALS

These resources may be helpful in addressing your concerns:

- Bias or Hate Reporting (<https://doso.students.wisc.edu/bias-or-hate-reporting/>)
- Graduate Assistantship Policies and Procedures (<https://hr.wisc.edu/policies/gapp/#grievance-procedure>)
- Hostile and Intimidating Behavior Policies and Procedures (<https://hr.wisc.edu/hib/>)
 - Office of the Provost for Faculty and Staff Affairs (<https://facstaff.provost.wisc.edu/>)
- Employee Assistance (<http://www.eao.wisc.edu/>) (for personal counseling and workplace consultation around communication and conflict involving graduate assistants and other employees, post-doctoral students, faculty and staff)
- Employee Disability Resource Office (<https://employeedisabilities.wisc.edu/>) (for qualified employees or applicants with disabilities to have equal employment opportunities)
- Graduate School (<https://grad.wisc.edu/>) (for informal advice at any level of review and for official appeals of program/departmental or school/college grievance decisions)
- Office of Compliance (<https://compliance.wisc.edu/>) (for class harassment and discrimination, including sexual harassment and sexual violence)
- Office Student Assistance and Support (OSAS) (<https://osas.wisc.edu/>) (for all students to seek grievance assistance and support)
- Office of Student Conduct and Community Standards (<https://conduct.students.wisc.edu/>) (for conflicts involving students)
- Ombuds Office for Faculty and Staff (<http://www.ombuds.wisc.edu/>) (for employed graduate students and post-docs, as well as faculty and staff)
- Title IX (<https://compliance.wisc.edu/titleix/>) (for concerns about discrimination)

Grievance Procedures: Industrial and Systems Engineering

If a graduate student feels unfairly treated or aggrieved by faculty, staff, or another student, the University offers several avenues to resolve the grievance. Student's concerns about unfair treatment are best handled directly with the person responsible for the objectionable action. If the student is uncomfortable making direct contact with the individual(s) involved, they should contact the advisor or the person in charge of the unit where the action occurred (program or department chair, section chair, lab manager, etc). Many departments and schools/colleges have established specific procedures for handling such situations; check their web pages and published handbooks for information. If such procedures exist at the local level, these should be investigated first. For more information, see the College of Engineering Policies and Procedures (<https://engineering.wisc.edu/report-an-incident/academic-grievances-and-complaints/>). The Assistant Dean for Graduate Affairs (enr-dean-graduateaffairs@enr.wisc.edu) provides overall leadership for graduate education in the College of Engineering (CoE), and is a point of contact for graduate students who have concerns about education, mentoring, research, or other difficulties.

Procedures for handling graduate student grievances against ISyE faculty, staff, or students:

1. The student is encouraged to speak first with the person toward whom the grievance is directed to see if a situation can be resolved at this level.
2. Should a satisfactory resolution not be achieved, the student should contact the Associate Chair for Graduate Affairs, to discuss the grievance. The Associate Chair will facilitate problem resolution through informal channels and facilitate any complaints or issues of students. The first attempt is to help students informally address the grievance prior to any formal complaint. Students are also encouraged to talk with their faculty advisors regarding concerns or difficulties, if necessary. University resources for sexual harassment, discrimination, disability accommodations, and other related concerns can be found on the UW Office of Compliance website (<https://compliance.wisc.edu/>).
3. If the issue is not resolved to the student's satisfaction, the student can submit the grievance to the Grievance Advisor, which may be either the Associate Chair for Graduate Affairs or the Department Chair, as chosen by the student. The grievance should be submitted in writing, within 60 calendar days of the alleged unfair treatment.
4. On receipt of a written complaint, the Grievance Advisor will form a faculty committee that will review the complaint and gather further information as necessary from the filer of the complaint and other

parties involved (including the party toward whom the complaint is directed).

5. The faculty committee will determine a decision regarding the grievance. The Grievance Advisor will report on the action taken by the committee in writing to both the student and the party toward whom the complaint was directed within 15 working days from the date the complaint was received.
6. At this point, if either party (the student or the person toward whom the grievance is directed) is unsatisfied with the decision of the faculty committee, the party may file a written appeal to the College of Engineering Assistant Dean for Graduate Affairs (enr-dean-graduateaffairs@engr.wisc.edu). Either party has 10 working days to file a written appeal to the School/College.
7. Documentation of the grievance will be stored for at least 7 years. Significant grievances that set a precedent will be stored indefinitely.
8. The Graduate School has procedures for students wishing to appeal a grievance decision made at the school/college level. These policies are described in the Graduate School Academic Policies and Procedures – Grievances & Appeals (<https://grad.wisc.edu/documents/grievances-and-appeals/>).

OTHER

n/a

PROFESSIONAL DEVELOPMENT

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 PI (<https://grad.wisc.edu/pd/idp/>)an (<https://grad.wisc.edu/pd/idp/>)

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

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.

Employer Recruitment List for Industrial Engineering Students: <https://ecs.wiscweb.wisc.edu/wp-content/uploads/sites/86/2017/03/IE-Employer-Recruitment-List-17-18.pdf>

UW Writing Ce (<http://writing.wisc.edu/>)nter (<http://writing.wisc.edu/>)

Location: 6171 Helen C. White Hall

Phone: (608) 263-1992

The UW Writing Center provides free 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 papers; instead, their goal is to teach students to edit and proofread on their own in order to become better, more confident writers.

LEARNING OUTCOMES

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.