

INDUSTRIAL ENGINEERING: SYSTEMS ENGINEERING AND ANALYTICS, MS

This is a named option course-based program within the Industrial and Systems Engineering MS (<https://guide.wisc.edu/graduate/industrial-systems-engineering/industrial-engineering-ms/>).

The program in Systems Engineering and Analytics (<https://pdc.wisc.edu/degrees/systems-engineering-analytics/>) will train students to recognize, identify, analyze, and solve decision problems arising in the efficient operations of engineering systems. The program focuses on methods and models for data analytics and data-driven decision-making.

IS THIS PROGRAM RIGHT FOR YOU?

Analytics, and the ability to effectively utilize data, is quickly becoming an important component in engineering decision-making. There is a strong need in the marketplace for people who use analytical tools to transform data into insights for making better decisions. The Systems Engineering and Analytics option within the UW-Madison graduate program in Industrial and Systems Engineering offers students the opportunity to pursue graduate training in this important and emerging area, under the auspices of the foremost experts in their field, in one of the world's top-ranked departments of industrial and systems engineering. (We were ranked 8th in the latest *U.S. News and World Report* rankings). The flexible curricula in Systems Engineering and Analytics enable students to tailor their degree program to suit their particular needs and career objectives.

After completing your degree, you will be able to analyze, process, and build conclusions based on the data you collect in the design, testing, and operations phases of engineering and design processes.

The program includes training in optimization models and methods, applied industrial analytics, simulation modeling and analysis, and courses wherein these analytical and computational tools are applied in an engineering systems setting. These learned skills are now highly sought after in manufacturing, transportation, finance, healthcare, and other industrial sectors.

See the Learning Outcomes (<https://guide.wisc.edu/graduate/industrial-systems-engineering/industrial-engineering-ms/#learningoutcomestext>) for this program.

If you have questions, please contact COE Grad Admissions at iegradadmission@engr.wisc.edu; Subject Line: IE Grad Admissions and I Sy E. Seniors please contact Pam Peterson, ppeterson@wisc.edu.

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 15
Spring Deadline	September 1
Summer Deadline	The program does not admit in the summer.
GRE (Graduate Record Examinations)	Not 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

DEADLINES

Please submit all application materials by the fall deadline to ensure full review of your application. Applications submitted after the fall deadline through March 15 will be reviewed if complete and will be considered for admission by the department if space is available. To check if space is available, please email: iegradadmission@engr.wisc.edu. (iegradadmission@engr.wisc.edu)

ADMISSION

Applicants must first meet all of the requirements of the Graduate School.

- Applicants must also meet department specific requirements as outlined below:
 - BS degree in engineering or related area or equivalent
 - Mathematical Statistics Course (for example, STAT 312 Introduction to Theory and Methods of Mathematical Statistics II or I SY E 210 Introduction to Industrial Statistics)
 - Introduction to Programming Course (for example, COMP SCI 220 Data Science Programming I)
 - International degree-seeking applicants must prove English proficiency using the Graduate School's requirements (<https://grad.wisc.edu/apply/requirements/>).
 - The Graduate Record Examination (GRE) is not required for this masters programs in Industrial and Systems Engineering (I Sy

E) . If GRE scores are submitted, they will not be used in admission decisions.

UW-Madison Students Applicants Only

UW-Madison undergraduate students applying to this program must submit a UW transcript, but it may be an unofficial transcript.

UW-Madison Industrial and Systems Engineering (I SY E) Student Applicants Only

Three letters of recommendation are NOT required for students completing their Industrial Engineering bachelor's degree at UW.

Please note that the application system will still require you to list three individuals as recommenders. You are welcome to list Sinan Tas, Pam Peterson, and Amanda Smith to bypass this requirement.

HOW TO APPLY

- Fill out an online application (<https://grad.wisc.edu/apply/>) through the Graduate School website. (<https://grad.wisc.edu/admissions/faq/>)**
- 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.
- Submit a Statement of Purpose (<https://grad.wisc.edu/prospective/prepare/statement/>) with your online application.** In this document, applicants should explain why they want to pursue further education in Industrial and Systems Engineering.
- English Proficiency Exam Information:** 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 (non expired).
- GRE Exam Information: (<https://www.ets.org/gre/>)** The GRE is not required for this program. If GRE scores are submitted, they will not be used in admission decisions.
- Electronically submit one copy of your unofficial transcript with your application.** Unofficial copies of transcripts are required for review. **Official** copies are required for applicants recommended for admission. Please do not send transcripts or any other application materials to the Graduate School or gradadmission@engr.wisc.edu.
- Upload your resume in your application.**
- Pay the Application Fee:** Information about the application fee may be found in the Graduate School FAQs (<https://grad.wisc.edu/apply/#FAQ>). Fee grants are available through the conditions outlined by the Graduate School (<https://grad.wisc.edu/apply/fee-grant/>).

Do not send materials/documents to the ISyE department or Graduate School until you are recommended for admission. 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.

PROGRAM RESOURCES

Tuition information for this program is available here (<https://pdc.wisc.edu/degrees/systems-engineering-analytics/>). Beginning in the fall semester of 2021, resident and resident reciprocity students are eligible for a tuition scholarship. Details here (<https://engineering.wisc.edu/wp-content/uploads/2022/05/Masters-Program-Tuition-CreditFall2021.pdf>).

Students enrolled in this program are not eligible to receive tuition remission from graduate assistantship appointments at this institution.

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 four credits during the fall and spring semesters and two credits during the 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.

NAMED OPTION REQUIREMENTS MODE OF INSTRUCTION

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

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	30 credits
Minimum Residence Credit Requirement	16 credits
Minimum Graduate Coursework Requirement	15 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.
Assessments and Examinations	None.
Language Requirements	No language requirements.

REQUIRED COURSES

Code	Title	Credits
Industrial and Systems Engineering (I SY E) ¹		
Students must complete at least 18 credits in the Industrial and Systems Engineering Department.		18
Electives		
Electives are chosen in consultation with advisor.		12
Optional Experiential Courses		
At most, 6 credits total from independent study, research, and internship / co-op courses may be applied towards the degree.		0–6
I SY E 699	Advanced Independent Study	
I SY E 790	Master's Research and Thesis	
I SY E 702	Graduate Cooperative Education Program	
Total Credits		30

¹ All credits must be from coursework numbered 300 or higher. Up to 6 credits of coursework numbered 300 to 399 may satisfy degree requirements.

Fall Potential Courses

Code	Title	Credits
I SY E 313	Engineering Economic Analysis	3
I SY E 315	Production Planning and Control	3
I SY E 415	Introduction to Manufacturing Systems, Design and Analysis	3
I SY E 412	Fundamentals of Industrial Data Analytics	3
I SY E/COMP SCI/ MATH 425	Introduction to Combinatorial Optimization	3
I SY E/M E 510	Facilities Planning	3
I SY E/M E 512	Inspection, Quality Control and Reliability	3
I SY E 515	Engineering Management of Continuous Process Improvement	3
I SY E 517	Decision Making in Health Care	3
I SY E 521	Machine Learning in Action for Industrial Engineers	3
I SY E/COMP SCI/ E C E 524	Introduction to Optimization	3
I SY E 601	Special Topics in Industrial Engineering	1-3
I SY E 603	Special Topics in Engineering Analytics and Operations Research	1-3
I SY E 604	Special Topics in Manufacturing and Supply Chain Management	1-3
I SY E 605	Computer Integrated Manufacturing	3
I SY E 624	Stochastic Modeling Techniques	3
I SY E 645	Engineering Models for Supply Chains	3
I SY E 649	Interactive Data Analytics	3
I SY E 699	Advanced Independent Study	1-5
I SY E/INFO SYS 722	Computer-Based Data Management	3

Spring Potential Courses

Code	Title	Credits
I SY E 313	Engineering Economic Analysis	3
I SY E 315	Production Planning and Control	3
I SY E 412	Fundamentals of Industrial Data Analytics	3
I SY E 415	Introduction to Manufacturing Systems, Design and Analysis	3
I SY E/M E 512	Inspection, Quality Control and Reliability	3
I SY E 516	Introduction to Decision Analysis	3
I SY E 517	Decision Making in Health Care	3
I SY E 521	Machine Learning in Action for Industrial Engineers	3
I SY E/COMP SCI/ E C E 524	Introduction to Optimization	3

ISY E 562	Human Factors of Data Science and Machine Learning	3
ISY E 575	Introduction to Quality Engineering	3
ISY E 601	Special Topics in Industrial Engineering	1-3
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 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/M E 643	Performance Analysis of Manufacturing Systems	3
ISY E 649	Interactive Data Analytics	3
ISY E 699	Advanced Independent Study	1-5

Summer Potential Courses

Code	Title	Credits
ISY E 313	Engineering Economic Analysis	3
ISY E 516	Introduction to Decision Analysis	3
ISY E/COMP SCI/ E C E 524	Introduction to Optimization	3
ISY E 575	Introduction to Quality Engineering	3
ISY E 601	Special Topics in Industrial Engineering	1-3
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/MATH/OTM/ STAT 632	Introduction to Stochastic Processes	3
ISY E 699	Advanced Independent Study	1-5
ISY E 702	Graduate Cooperative Education Program	1-2

Other Policy

Students in this program may not take courses outside the prescribed curriculum without faculty advisor and program director approval. Students in this program cannot enroll concurrently in other undergraduate or graduate degree programs.

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.

NAMED OPTION-SPECIFIC POLICIES

PRIOR COURSEWORK

Graduate Credits Earned at Other Institutions

With program approval, students may transfer no more than 9 credits of graduate course work from other institutions. Coursework earned ten or more years prior to admission to a master's degree is not allowed to satisfy requirements.

Undergraduate Credits Earned at Other Institutions or UW-Madison

UW-Madison students completing their bachelor's degree in the Industrial and Systems Engineering department may transfer up to 6 credits of coursework numbered 300 or above toward the degree with prior program approval. Undergraduate credits earned at other institutions may transfer. Coursework earned ten or more years prior to admission to a master's 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

Refer to the Graduate School: Probation (<https://policy.wisc.edu/library/UW-1217/>) policy.

ADVISOR / COMMITTEE

Per the Graduate School: Advisor (<https://policy.wisc.edu/library/UW-1232/>) policy, (<https://policy.wisc.edu/library/UW-1232/>) every graduate student MUST have a faculty advisor. Students in this program will be advised by the department's Director of Professional Masters Programs. A faculty advisor provides the graduate student with academic guidance regarding their course selection and research oversight in their thesis or project. Graduate students should always seek advice from their advisor and other faculty in their interest area prior to enrolling for courses.

CREDITS PER TERM ALLOWED

Enrollment of 12 credits is highly recommended.

TIME LIMITS

This program is designed to be completed in 16 months. Students who have an undergraduate degree from UW-Madison can typically complete the program in 12 months. Internship and co-operative (co-op) work experiences are an optional component to this degree. The program must be completed within 24 months for students who plan to include internship or co-op work. The ISyE department does not guarantee availability of internship or co-op positions.

The student is required to meet their academic advisor during their first semester to discuss and obtain approval of the course plan for the remainder of their program. In situations that the student cannot finish the program in 24 months due to exceptional circumstances,

the exception must be requested by the student and approved by the student's academic advisor and the academic affairs committee.

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@engr.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

Continuing to the PhD Program:

- Admission and successful completion of the MS program does not imply admittance to the ISyE PhD program. Students wishing to take the PhD qualifying exam must first be admitted to the PhD program.
- ISyE MS students wishing to continue to the PhD program must have their admission to the PhD program recommended by an ISyE faculty member with tenure home in ISyE who is willing to serve as the student's PhD advisor. The admission of such students will then be evaluated by the associate chair for graduate affairs or admissions

committee using the same evaluation process as for all PhD program applicants.

- To apply to the PhD program, log in to MyUW, click on Graduate Student Portal, and then click on Add/Change Programs. Select the information for the program for which you are applying.

For additional information, please contact iegradadmission@engr.wisc.edu

Graduate Assistant Positions

Students are strongly discouraged to pursue positions as Project Assistants, Teaching Assistants or Research Assistants during their time in this program, as the rigor and accelerated nature of this program may not accommodate those work time commitments. Students in this program will not receive the tuition remission that is typically part of the compensation package for a graduate assistantship.

Policies on Program Transfer

- It is not allowed to transfer between the Systems Engineering and Analytics and Research named option programs.
- If a student currently in another graduate program wants to transfer to the course option Industrial Engineering, MS they should follow the general application procedure for the course option Industrial Engineering, MS program along with submitting an Add/Change of Program, Plan or Named Option Request online through the Graduate School.

- 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 Center (<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.

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 P (<https://grad.wisc.edu/pd/idp/>)lan (<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