

INDUSTRIAL ENGINEERING: SYSTEMS ENGINEERING AND ANALYTICS, M.S.

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

The program in Systems Engineering and Analytics (<https://www.engr.wisc.edu/app/uploads/2017/02/SEA-Web-1.pdf>) 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 *US 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.

WHAT YOU LEARN

- Acquire mathematical, scientific, and engineering principles in analytics.
- Utilize data-driven methodologies to formulate, analyze, and solve advanced engineering problems.
- Evaluate relevant analytical, computational, engineering tools to address advanced systems engineering problems.
- Solve real-world problems using computer-assisted, data-driven decision making technologies.

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, prpeterson@wisc.edu.

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	October 1
Summer Deadline	The program does not admit in the summer.
GRE (Graduate Record Examinations)	Required.*
English Proficiency Test	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 (https://grad.wisc.edu/apply/requirements/#english-proficiency).
Other Test(s) (e.g., GMAT, MCAT)	n/a
Letters of Recommendation Required	3

- * a) UW-Madison Industrial Engineering undergrads and applicants with prior institutional approval are waived from the GRE requirement.
b) GRE scores will not be required for Spring, Summer, or Fall 2022 admission due to challenges taking the exam during the COVID-19 pandemic.

APPLICATION DEADLINES

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

ADMISSIONS

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)
 - Introduction to Programming Course (for example, COMP SCI 220 Data Science Programming I)
 - Non-native English speakers must have a Test of English as a Foreign Language (TOEFL) score of 580 (written), 243 (computer-based test), or 92 (Internet version).
 - The Graduate Record Examination (GRE) is *required for this masters programs in I Sy E. Information on taking the GRE exam

can be found here (<https://www.ets.org/gre/>). **Please note:** Applicants should plan to take their exam by December 1 to allow scores to be sent and processed.

**UW-Madison I Sy E undergrads and applicants with prior institutional approval are waived from the GRE requirement.*

FOR UW-MADISON STUDENTS ONLY:

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

FOR UW-MADISON I SY E STUDENTS ONLY:

1. **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 Jim Luedtke, Pam Peterson, and Francisca Jofre to bypass this requirement.
2. **I Sy E undergrads and applicants with prior institutional approval are waived from the GRE requirement.**
3. UW-Madison students completing their bachelor's degree in the Industrial and Systems Engineering department may count up to 6 credits of coursework numbered 300 or above toward the degree with prior program approval. Coursework earned five or more years prior to admission to a master's degree is not allowed to satisfy requirements.

HOW TO APPLY

1. **Fill out an online application** (<https://apply.grad.wisc.edu/Account/Login/?ReturnUrl=%2f>) 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. **GRE Exam Information** (<https://www.ets.org/gre/>): The course-only option does require the GRE exam be taken by prospective students as part of the application but **note there are no specific scoring guidelines for the exam** as the GRE is only one part of the consideration for admission into the program. **Please note:** Applicants should plan to take their exam by Dec. 1st to allow scores to be sent and processed.
5. **TOEFL Exam Information: Ask ETS** (<https://www.ets.org/>) **to submit your 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 the 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 the 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.

Apply now

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

***Application deadlines are strictly enforced and ALL application materials including transcripts, letters 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 I Sy E department and Graduate School requirements for admission and if you feel you meet the necessary criteria for applying, please do so.**

QUESTIONS?

Check out the Admissions FAQ (<https://grad.wisc.edu/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 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://www.engr.wisc.edu/app/uploads/2017/02/Resident-Tuition-Scholarship-for-Course-Based-MS-Programs.pdf>).

Financial assistance, such as TA, PA, or RA positions from the university or the department is not recommended given the accelerated structure and timeline of the program.

REQUIREMENTS

MINIMUM GRADUATE SCHOOL REQUIREMENTS

Review the Graduate School minimum academic progress and degree requirements (<http://guide.wisc.edu/graduate/#policiesandrequirements>), 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 are able to complete a program with minimal disruptions to careers and other commitments.

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

Requirements Detail

Minimum Credit Requirement	30 credits
Minimum Residence Credit Requirement	16 credits
Minimum Graduate Coursework Requirement	Half of degree coursework (15 credits out of 30 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 (https://registrar.wisc.edu/course-guide (https://registrar.wisc.edu/course-guide/)).
Overall Graduate GPA Requirement	3.00 GPA required.
Other Grade Requirements	Grades of C and D received by a candidate in any graduate course will not be counted as credit toward the degree. These grades will be counted in the graduate GPA.
Assessments and Examinations	None.
Language Requirements	No language requirements.

REQUIRED COURSES

As stated above, of the required credits, all must be at the 300 level or higher, at most 6 credits may be at the 300 level, at least 15 must be at the graduate level, at least 18 credits must be in the Industrial and Systems Engineering Department, and at least 16 credits must be taken as a graduate student in residence at UW-Madison.

Below is a typical curriculum for those pursuing an M.S. in Industrial Engineering with a course option in Systems Engineering and Analytics. Please note the Systems Engineering and Analytics program is a customizable program and students should work out other course options with their faculty advisor.

PLANNING GRIDS:

- SEA FALL Course Planning Grid (<https://www.engr.wisc.edu/app/uploads/2016/02/MSIE-Named-Option-SEA-FALL-2018-update.pdf>)

- SEA SPRING Course Planning Grid (<https://www.engr.wisc.edu/app/uploads/2016/02/MSIE-Named-Option-SEA-SPRING-2018-UPDATE-V2.pdf>)

Fall Potential Courses:

Code	Title	Credits
ISY E 313	Engineering Economic Analysis	3
ISY E 412	Fundamentals of Industrial Data Analytics	3
ISY E/COMP SCI/MATH 425	Introduction to Combinatorial Optimization	3
ISY E/M E 510	Facilities Planning	3
ISY E/M E 512	Inspection, Quality Control and Reliability	3
ISY E 515	Engineering Management of Continuous Process Improvement	3
ISY E/COMP SCI/E C E 524	Introduction to Optimization	3
ISY E/COMP SCI/MATH/STAT 525	Linear Optimization	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 605	Computer Integrated Manufacturing	3
ISY E 624	Stochastic Modeling Techniques	3
ISY E/MATH/OTM/STAT 632	Introduction to Stochastic Processes	3
ISY E 645	Engineering Models for Supply Chains	3
ISY E/PSYCH 653	Organization and Job Design	3
ISY E 699	Advanced Independent Study	1-5
ISY E/INFO SYS 722	Computer-Based Data Management	3

Spring Potential Courses:

Code	Title	Credits
ISY E 313	Engineering Economic Analysis	3
ISY E 412	Fundamentals of Industrial Data Analytics	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/COMP SCI/E C E 524	Introduction to Optimization	3
ISY E/COMP SCI/MATH/STAT 525	Linear 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 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 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/ ECE 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

If the courses were numbered 700 or above they may count toward the minimum graduate coursework (50%) requirement. Coursework earned five or more years prior to admission to a master's degree is not allowed to satisfy requirements.

PROBATION

The Graduate School regularly reviews the record of any student who earned grades of BC, C, D, F, or Incomplete in a graduate course (300 or above), or grade of U in research credits. This review could result in academic probation with a hold on future enrollment or in being suspended from the Graduate School.

ADVISOR / COMMITTEE

Per Graduate School policy, every graduate student MUST have a faculty advisor. 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 CONSTRAINTS

This program is designed to be completed 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 experiences during their program. The ISyE department does not guarantee availability of internship or co-op positions.

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/>)
- Dean of Students Office (<https://doso.students.wisc.edu/>) (for all students to seek grievance assistance and support)
- 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://employee disabilities.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 of Student Conduct and Community Standards (<https://conduct.students.wisc.edu/>) (for conflicts involving students)

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.

NAMED OPTION-SPECIFIC POLICIES

PRIOR COURSEWORK

Graduate Work from Other Institutions

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

UW–Madison Undergraduate

UW-Madison students completing their bachelor's degree in the Industrial and Systems Engineering department may count up to 6 credits of coursework numbered 300 or above toward the degree with prior program approval. 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.

- 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://www.engr.wisc.edu/academics/student-services/academic-advising/policies-and-procedures/>). 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 Department Chair. The grievance should be submitted in writing, within 60 calendar days of the alleged unfair treatment.
4. On receipt of a written complaint, the Department Chair 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 Department Chair 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

Course-Based Option Policy (<https://www.engr.wisc.edu/app/uploads/2016/02/ISyE-16.2-Named-Options-Policy-Requirements-2.pdf>)

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/IDP/](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/](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 CENTER ([HTTP://WRITING.WISC.EDU/](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 papers. Instead, their goal is to teach students to edit and proofread on their own in order to become a better, more confident writer.

Francisca Jofre

GRADUATE PROGRAM COORDINATOR

Pam Peterson

See also Industrial and Systems Engineering Faculty Directory (<http://directory.engr.wisc.edu/ie/faculty/>).

PEOPLE

PROFESSORS

Laura Albert (Chair)
Oguzhan Alagoz
John D. Lee
Jeffrey Linderoth
James Luedtke
Robert Radwin
Leyuan Shi
Raj Veeramani
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