Twin Cities Campus

Industrial and Systems Engineering M.S.I.SY.E.

Industrial and Systems Engineering

College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Industrial and Systems Engineering Graduate Program, University of Minnesota, 1120 Mechanical Engineering, 111 Church Street S.E., Minneapolis, MN 55455 (612-625-2009; fax 612-624-2010)
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Website: http://www.isye.umn.edu/

- Program Type: Master's
- Requirements for this program are current for Fall 2019
- Length of program in credits: 30 to 32
- This program does not require summer semesters for timely completion.
- Degree: Master of Science in Industrial & Systems Engr

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The industrial and systems engineering (ISyE) program offers coursework and research in industrial and systems engineering, operations research, and human factors. Special emphasis is on methodologies for design, planning, and management of service and manufacturing systems. Examples of research applications include logistics, transportation, healthcare delivery systems, revenue management, and supply chain management.

The Department of Industrial & Systems Engineering offers an MS degree with three tracks the Industrial Engineering track, the Systems Engineering track, and the Analytics track and a PhD degree. MS degree applicants must indicate which track they are applying for on the application form. Note that the admission requirements for the three tracks are different. In addition, the ISyE program also offers a dual MS in ISyE and Civil Engineering (Transportation Engineering focus) and an integrated bachelor's/master's program.

Program Delivery

This program is available:

- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission

The preferred undergraduate GPA for admittance to the program is 3.00.

A baccalaureate degree in engineering or a closely related field is required.

Other requirements to be completed before admission:
Applicants to the systems engineering track are required to have at least two years of professional work experience in a technical field. Promising candidates with less experience will be considered under exceptional circumstances. Applicants must submit three letters of recommendation and a personal statement. In addition to the academic record, the professional record of the applicant and the letters of recommendation carry weight in admission decisions. A GRE score is not required.

Special Application Requirements:
All application materials should be submitted electronically through the ApplyYourself application system.

Applicants to the industrial engineering and analytics tracks must submit a GRE score. Letters of recommendation are not required, but are highly recommended if you want to be considered for financial aid.

Applications for the analytics track are accepted for fall semester only.

The application deadlines are February 15 for fall semester and October 15 for spring semester. Additional information is available at www.isye.umn.edu/apply/

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5

Key to test abbreviations(GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits.The final exam is oral.

Plan B: Plan B requires 16 to 24 major credits and 6 to 14 credits outside the major.The final exam is oral.

Plan C: Plan C requires 16 to 26 major credits and 6 to 16 credits outside the major.The is no final exam.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

The Master of Science in Industrial and Systems Engineering (M.S.I.Sy.E.) is offered with three tracks.

The industrial engineering track has three options. Plan A (thesis) and Plan B (project) require 30 credits and Plan C (coursework) requires 32 credits. Plan A requires a minimum of 14 course credits in the major field, and Plan B or Plan C requires 16 course credits in the major field. All plans must include a minimum of 6 course credits in a minor or related field outside ISyE and 1 credit of graduate seminar. The remaining credits may be taken in the major field or any supporting field.

The systems engineering track is a coursework-only option (Plan C) requiring 30 credits. It requires a minimum of 14 course credits in the major field and 6 course credits in a minor or related field outside ISyE. The remaining 10 credits may be taken in the major or in any supporting field.

The analytics track is a coursework-only option (Plan C) requiring 30-32 credits. Students proceed through the program and advance as a cohort. The program requires 24 credits in core courses and a minimum of 6 credits in elective courses. In addition, non-native English speakers are required to take the 2-credit course ESL 5008.

Students may replace a required course with a qualifying replacement course if they have taken the equivalent of the required course elsewhere. A list of qualifying replacements is available on the ISyE program web page.

Joint- or Dual-degree Coursework: Dual M.S. in ISyE and Civil Engineering (Transportation Engineering Focus): Student may take a total of 15 credits in common among the academic programs.

Program Sub-plans

Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Industrial Engineering

Plan A

Required Courses

IE 5531 - Engineering Optimization I (4.0 cr)
IE 5532 - Stochastic Models (4.0 cr)
ME 8001 - Research Ethics and Professional Practice (0.0 cr)
Take 1 or more course(s) from the following:

•IE 5511 - Human Factors and Work Analysis (4.0 cr)
•IE 5545 - Decision Analysis (4.0 cr)
•IE 5551 - Production and Inventory Systems (4.0 cr)

Seminar

Take 1 seminar credit. The following may be used or consult with advisor for further options.
IE 8773 - Graduate Seminar (1.0 cr)
or IE 8774 - Graduate Seminar (1.0 cr)

Thesis Credits

Take 10 credits
IE 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Plan B or Plan C

Required Courses

IE 5531 - Engineering Optimization I (4.0 cr)
IE 5532 - Stochastic Models (4.0 cr)
ME 8001 - Research Ethics and Professional Practice (0.0 cr)
Take 2 or more course(s) from the following:
•IE 5511 - Human Factors and Work Analysis (4.0 cr)
•IE 5545 - Decision Analysis (4.0 cr)
•IE 5551 - Production and Inventory Systems (4.0 cr)

Seminar

Take 1 seminar credit. The following may be used or consult with advisor for further options.
IE 8773 - Graduate Seminar (1.0 cr)
or IE 8774 - Graduate Seminar (1.0 cr)

Project Requirement

Plan B students must either take the Plan B course IE 8794 (4 credits), or complete one to three Plan B papers, determined in consultation with the advisor.
IE 8794 - Industrial Engineering Research (1.0 - 6.0 cr)

Systems Engineering

This sub-plan is limited to students completing the program under Plan C.

Required Courses

IE 5111 - Systems Engineering I (2.0 cr)
IE 5113 - Systems Engineering II (4.0 cr)
IE 5541 - Project Management (4.0 cr)
IE 5553 - Simulation (4.0 cr)
ME 8001 - Research Ethics and Professional Practice (0.0 cr)

Analytics

This sub-plan is limited to students completing the program under Plan C.

Required Courses

IE 5531 - Engineering Optimization I (4.0 cr)
IE 5532 - Stochastic Models (4.0 cr)
IE 5561 - Analytics and Data-Driven Decision Making (4.0 cr)
IE 5773 - Practice-focused Seminar (1.0 cr)
IE 5801 - Capstone Project (4.0 cr)
ME 8001 - Research Ethics and Professional Practice (0.0 cr)
STAT 5302 - Applied Regression Analysis (4.0 cr)
CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
or CSCI 5523 - Introduction to Data Mining (3.0 cr)

Electives

Additional courses may be approved by the Director of Graduate Studies.
Take 6 or more credit(s) from the following:
•CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
•CSCI 5523 - Introduction to Data Mining (3.0 cr)
•IE 5441 - Financial Decision Making (4.0 cr)
•IE 5522 - Quality Engineering and Reliability (4.0 cr)
•IE 5541 - Project Management (4.0 cr)
•IE 5545 - Decision Analysis (4.0 cr)
•IE 5551 - Production and Inventory Systems (4.0 cr)
•IE 5553 - Simulation (4.0 cr)
•PUBH 7475 - Statistical Learning and Data Mining (3.0 cr)
•STAT 5303 - Designing Experiments (4.0 cr)

•STAT 5401 - Applied Multivariate Methods (3.0 cr)
•STAT 5421 - Analysis of Categorical Data (3.0 cr)
•STAT 5601 - Nonparametric Methods (3.0 cr)

English Proficiency

Non-native English speakers are required to take the following:
ESL 5008 - Speaking for Professional Settings (2.0 cr)

Integrated B.I.Sy.E./M.S.I.Sy.E.

This sub-plan is optional and does not fulfill the sub-plan requirement for this program.

This sub-plan is limited to students completing the program under Plan C.

The Department of Industrial and Systems Engineering offers an integrated bachelor's/master's degree program. The program makes it possible for students to earn both a bachelor's degree (B.I.Sy.E.) and a master's degree (M.S.I.Sy.E.) in Industrial and Systems Engineering in five years. The program has several benefits: a streamlined admissions process from the undergraduate to the graduate program; graduate student status granted in the senior year; eligibility for teaching and research assistantships; and, flexibility in fulfilling required courses for both degrees simultaneously in the last two years of study. The integrated program is available only for the Analytics Track.

Both the BISyE and MSISyE degrees must be completed in their entirety, with no courses shared between them. The graduate degree cannot be earned before the undergraduate requirements are satisfied. Admitted students who decide not to complete the MSISyE degree are permitted to count credits originally planned for the graduate program toward their undergraduate technical electives.

Eligibility Requirements:
-Students must be enrolled in the Industrial and Systems Engineering undergraduate program at the University of Minnesota-Twin Cities.
-Applicants must have a minimum cumulative GPA of at least 3.4 or a strong letter of recommendation from an ISyE faculty member.
-The following courses must be completed or in progress at the time of application: IE 1101, IE 2021, IE 3011, IE 3012, IE 3521, IE 3522, IE 4011, and IE 4551.