

INDUSTRIAL ENGINEERING (B.S.)

Program Mission: The mission of the undergraduate program in Industrial Engineering is to educate our students for leadership positions in a broad spectrum of employment including: manufacturing, supply chain management and logistics, health care, banking, information management, and related disciplines.

Program Vision: The Department of Industrial and Systems Engineering offers the B.S. in Industrial Engineering to prepare students for a broad range of employment opportunities that include operations management, manufacturing, and healthcare. Our vision is to produce graduates who will lead their organizations to competitive advantage by applying the tools and techniques of industrial engineering. We believe that exposing students to diverse industries in our educational program will enhance their professional skills.

Program Educational Objectives: Building on skills developed in the academic program, and extended by experience and personal self-improvement, the graduates of our program have the ability to:

1. Utilize technical know-how and apply practical problem-solving to deliver significant organizational value as recognized via promotions, raises, awards, publications, inventions, patents, and/or leadership positions.
2. Demonstrate commitment to industrial engineering as a global service profession and practice with integrity, innovation, and objectivity as indicated by professional affiliations, public speaking, thought leadership, publishing, reputation, volunteering, public recognitions, and other related activities.
3. Display the know-how and motivation for continual development by enhancing personal and professional skills via self-study, post-undergraduate degrees, professional certificates, and various other life-long learning experiences.

Admission Requirements

For admission to the Bachelor of Science program, students must satisfy the admission criteria of the Division of Engineering, College of Engineering (<http://bulletins.wayne.edu/undergraduate/college-engineering/bs/>).

Program Requirements

Candidates for the Bachelor of Science degree must complete 122 credits of coursework, including the University General Education (<http://bulletins.wayne.edu/undergraduate/general-information/general-education/>) requirements. All course work must be completed in accordance with the academic procedures of the University (<http://bulletins.wayne.edu/undergraduate/general-information/>) and the College of Engineering (<http://bulletins.wayne.edu/undergraduate/college-engineering/academic-regulations/>) governing undergraduate scholarship and degrees. Non-engineering courses, cited below by subject rather than by individual course numbers, indicate courses to be selected in fulfillment of University General Education Requirements. The degree requirements shown in the curriculum below are in effect as of the publication date of this bulletin. However, students should consult an academic advisor for verification of current requirements.

The Bachelor of Science degree programs are built on a strong core of common courses. In the junior and senior years, students must choose an area of study leading to the industrial engineering degree. These

options are described below, including the Data Science and Analytics concentration (p. 2).

The directed elective must be approved by the program director or undergraduate advisor. A list of courses appropriate for the directed elective is available from the Department.

Engineering Breadth Options: In the following curricula engineering Breadth Options are courses selected from an approved list of those deemed most suitable as contributing to the industrial engineering degree program. In the sophomore year these options are limited to courses numbered below 3000 for all students who have NOT completed their preprofessional coursework.

The Engineering Design Project course sequence (IE 4800 and IE 4880) is a capstone endeavor and is intended to build on and integrate the knowledge that the student has accumulated throughout the undergraduate program. It is intended to be taken in the student's last academic year, within forty credits of graduation. This sequence is a year-long undertaking. Students enroll in IE 4800 (two credits) in their last Fall semester, and spend the term building their teamwork skills and selecting and planning their project. Practical, professionally-relevant projects are usually selected in concert with the Department's industrial partners. In the Winter semester, students enroll in IE 4880 (2 credits) and engage in an intensive effort to bring their industrial engineering skills and knowledge to bear on the problem. Students who intend to take the capstone sequence should first consult their academic advisor.

Project Requirements: In order to qualify to take IE 4800, students must be in the last year of his/her program (within forty credits of graduating). To enroll in IE 4800, the student must have taken and passed IE 3120, IE 4250, IE 4850, and should have taken and passed or be taking at least two of the IE 4420, IE 4330, IE 4560 in the same semester of IE 4800.

In order to register for IE 4880, students must have taken IE 4800 in the immediately previous term they must be finished with all eight IE core courses by the end of the semester in which they take IE 4880. Students are encouraged to meet with the industrial engineering program academic advisor for a plan of work to ensure they meet these requirements.

First Year		
First Semester		Credits
BE 1200	Basic Engineering I: Design in Engineering	3
ENG 1020	Introductory College Writing	3
CHM 1125	General Chemistry I for Engineers	3
CHM 1130	General Chemistry I Laboratory	1
MAT 2010	Calculus I	4
Wayne Experience (WE) (FYS 1010 is recommended)		1
		Credits
		15
Second Semester		
BE 1300	Basic Engineering II: Materials Science for Engineering Applications	3
BE 1310	Materials Science for Engineering: Laboratory	1
MAT 2020	Calculus II	4
PHI 1120	Professional Ethics	3
PHY 2170	University Physics I for Scientists and Engineers	4
		Credits
		15
Second Year		
First Semester		Credits
BE 2100	Basic Engineering III: Probability and Statistics in Engineering	3
MAT 2030	Calculus III	4
PHY 2180	University Physics II for Scientists and Engineers	4
Engineering Breadth Option		3
		Credits
		14

Industrial Engineering (IE) Honors requirements

Students in the B.S.I.E. program are encouraged to pursue their degree with Engineering and/or University Honors. Honors requirements for the ISE Department include the following:

- Must establish and maintain a cumulative 3.3 overall GPA and 3.45 Honors GPA
- Meet the minimum requirement of 16 credits, including the following courses:
 - HON 42XX –Honors Seminar (3 cr.)
 - BE 5998 – Engineering Honors Thesis (4 cr.)
 - Honors Option in IE 4310 (3 cr.)
 - Two IE graduate level courses (IE 5000-6999) (6 cr.)

Second Semester		
MAT 2150	Differential Equations and Matrix Algebra	4
ECO 2010	Principles of Microeconomics	4
BE 1600	Introduction to Programming and Computation: Python	3
Diversity, Equity and Inclusion (DEI) course		3
IE Technical Elective		3
Credits		17
Third Year		
First Semester		
ENG 3050	Technical Communication I: Reports	3
IE 3120	Work Design	3
IE 4850	Engineering Economy	3
Global Learning (GL) course		3
IE Technical Elective		3
IE Technical Elective		3
Credits		18
Second Semester		
ENG 3060	Technical Communication II: Presentations	3
IE 4420	Systems Simulation	3
IE 4250	Data Science and Analysis	3
Engineering Breadth Option		3
Civic Literacy (CIV) course		3
Credits		15
Fourth Year		
First Semester		
IE 4260	Principles of Quality Control	3
IE 4560	Operations Research	3
IE 4800	Engineering Design I: Project Management	2
Directed Elective		3
IE Technical Elective		3
Credits		14
Second Semester		
IE 4310	Production Control	3
IE 4330	Facilities Design	3
IE 4880	Engineering Design II	2
IE Technical Elective		3
IE Technical Elective		3
Credits		14
Total Credits		122

Data Science and Analytics Concentration

The Data Science and Analytics concentration is designed to give industrial engineering undergraduate students a core of data science related skills to identify, analyze, and solve problems in manufacturing and service domains.

The program requires students to complete a minimum of **nine credits** in course work, **at least one** course from Data Science and Analytics (DSA), **at most one** course from Data Science for Business (DSB), and **at most one** course from Data Science for Engineering (DSE). All DSA, DSB, and DSE courses are three credits each and are offered in the M.S. in Data Science and Business Analytics program, which is offered by The Mike Ilitch School of Business and Industrial and Systems Engineering and Computer Science Departments in College of Engineering. This curriculum will give students an integrated breadth of industrial engineering tailored to their specific interests and career goals in the field of data science. A minimum 2.50 grade point average among the courses taken towards data science concentration is required to complete the program.