

INDUSTRIAL ENGINEERING

Home Department: Industrial and Manufacturing Engineering

Interim Department Head:

Dr. Farnaz Ghazi-Nezami
Room 1-700J, AB, 810-762-7974
ime@kettering.edu

Program Overview

The Department of Industrial & Manufacturing Engineering offers a Bachelor of Science in Industrial Engineering (IE). The department emphasizes development of the student's ability to analyze operational requirements and to design processes that systematically integrate customer needs, technology, and economic and social factors for industrial, service, and governmental organizations.

Industrial Engineering is a discipline known for its breadth of scope and application. The preparation received in industrial engineering is valuable to virtually all industrial, commercial and governmental entities that are engaged in manufacture of a product or provision of a service. Graduates typically are responsible for the design of integrated systems at one of two levels.

The first level may be described as the "human activity systems" level and is concerned with design of the physical workplace at which human activity occurs. The second level, the "management control system" level, is concerned with planning, measuring, and controlling the activities of the organization for optimal utilization of its resources. The use of computers and the development of the associated software are integral parts of both levels of systems design. Industrial Engineers are concerned with systematic design and integration of people, raw materials, facilities, information, and energy to produce safe and quality products and/or services at an affordable cost to the consumer.

The Industrial Engineering curriculum develops the engineering theory, the practical background, and the people skills necessary to design optimal productive work and management control systems for an organization. The Industrial Engineering curriculum is designed to provide the student with a sound theoretical background while being oriented toward applied problem-solving. Classroom instruction is backed by hands-on application in well-equipped laboratory facilities including Applied Control Systems, Work Design, Human Factors (Ergonomics), Manufacturing Materials and Processes, Methods Analysis, and Simulation Modeling.

The Industrial Engineering program is accredited by the Engineering Accreditation Commission (EAC) of ABET.

Program Educational Objectives

Within a few years of graduation, Bachelor of Science in Industrial Engineering graduates will have attained:

- The ability to apply current principles of Industrial Engineering to solve complex, real-world problems and overcome challenges facing themselves, their organizations, and the community.
- Exemplary teamwork and leadership skills, growing professionally and increasing their level of responsibility and authority.
- The ability and motivation to expand their knowledge and technological skillset throughout their lives and careers.

Dual Majors

Coordinated programs are available to earn both a Bachelor of Science in Industrial Engineering and a Bachelor of Science in other fields such as Management, Chemical Engineering, Computer Science, and Mechanical Engineering. Generally, completing such a program requires one or two additional academic terms at Kettering University. It is the student's responsibility to determine that all requirements are satisfied for both programs. The student must be advised by both programs each term.

Minors

Many academic departments offer minors. For a list of minors see Academic Programs, Minors.

BS/MASTERS PATHWAY

Undergraduate students also have an opportunity to get their bachelor's and master's degrees in five years with the BS/MASTERS Pathway.

Industrial Engineering Program Curriculum Requirements

Code	Title	Credit Hours
First Year Experience		
CILE-101	First Year Foundations	1
General Education		
COMM-101	Rhetoric & Writing	4
ECON-201	Economic Principles	4
LA-201	Sophomore Seminar: Exploring the Human Condition	4
LA-489	Sr. Seminar: Leadership, Ethics	4
Advanced Humanities Electives ¹		8
Advanced Social Science Electives ¹		8
Total Credit Hours		33

¹ Humanities and Social Science advanced electives must be selected from approved 300 and 400 level courses.

Code	Title	Credit Hours
Mathematics and Basic Sciences		
CHEM-135 & CHEM-136	Principles of Chemistry and Principles of Chemistry Lab	4
MATH-101	Calculus I	4
or MATH-101X	Calculus I	
MATH-102	Calculus II	4
or MATH-102X	Calculus II	
MATH-203	Multivariate Calculus	4
or MATH-203X	Multivariate Calculus	
Select one of the following:		4
MATH-204	Differential Equations & Laplace Transforms	
MATH-307	Matrix Algebra	
MATH-258	Probability and Statistics	4
IME-332	Engineering Statistics	4

PHYS-114 & PHYS-115	Newtonian Mechanics and Newtonian Mechanics Laboratory	4
PHYS-224 & PHYS-225	Electricity and Magnetism and Electricity and Magnetism Laboratory	4
Science or Math Electives ¹		4
<i>Credit Hours Subtotal:</i>		40
Engineering Topics		
IME-100	Interdisciplinary Design and Manufacturing	4
IME-200	Introduction to Industrial Engineering	4
Select One of the following		4
CS-101	Computing & Algorithms I	
ECE-101	MATLAB and C Programming	
IME-211	Algorithms and Computer Programming	
IME-321	Operations Research - Deterministic Models	4
IME-351	Engineering Economics	4
IME-361	Lean Work Design	4
IME-422	Simulation	4
IME-452	Production System Design	4
IME-453	Supply Chain Design	4
IME-454	Senior Design Project	4
MECH-100	Engineering Graphical Communication	4
MECH-210	Statics	4
<i>Credit Hours Subtotal:</i>		48
IE Program Electives		
Select one of the following Human Factors requirements:		4
IME-462	Ergonomics	
IME-463	Safety and Human Factors	
IME-465	Human-Computer Interaction and Interface Design	
Select one of the following Manufacturing requirements:		4
IME-300	Manufacturing Processes	
IME-403	Computer Numerical Control Machining	
IME-408	Industrial Robotics	
IME-412	Applied Control Systems Design	
Select one of the following Quality & Statistics requirements:		4
IME-471	Quality Control	
IME-473	Design of Experiments	
IME-476	Lean Six Sigma	
IME Electives		8
<i>Credit Hours Subtotal:</i>		20
Electives		
Technical Electives ²		8
Free Electives		8
<i>Credit Hours Subtotal:</i>		16
Culminating Undergraduate Experience		
CILE-400	Culminating Undergraduate Experience: Thesis	4
<i>Credit Hours Subtotal:</i>		4
Total Credit Hours		128

(Minimum) Total Credits Required for Program: 161

¹ The Science or Math Elective may be any course with a MATH, CHEM, PHYS or BIOL prefix except MATH-100. Students taking CHEM-135 may not take CHEM-137 as a Science Elective.

² Technical electives include any CE, CHME, CS, ECE, EE, IME, or MECH course not already used to satisfy degree requirements. One must be 200-level or higher and one must be 300-level or higher.

³ Students are automatically registered for CILE-400 in a co-op term when they reach Junior II status.

Representative Program

Course	Title	Credit Hours
Freshman I		
CILE-101	First Year Foundations	1
COMM-101	Rhetoric & Writing	4
CHEM-135	Principles of Chemistry	3
CHEM-136	Principles of Chemistry Lab	1
MATH-101	Calculus I	4
IME-100	Interdisciplinary Design and Manufacturing	4
Credit Hours		17
Freshman II		
MATH-102	Calculus II	4
PHYS-114	Newtonian Mechanics	3
PHYS-115	Newtonian Mechanics Laboratory	1
MECH-100	Engineering Graphical Communication	4
IME-200	Introduction to Industrial Engineering	4
Credit Hours		16
Sophomore I		
ECON-201	Economic Principles	4
IME-211 or CS-101 or ECE-101	Algorithms and Computer Programming or Computing & Algorithms I or MATLAB and C Programming	4
MATH-203	Multivariate Calculus	4
MATH-258	Probability and Statistics (Select One of the Following)	4
Credit Hours		16
Sophomore II		
LS-201	Sophomore Seminar: Exploring the Human Condition	4
MATH-204 or MATH-307	Differential Equations & Laplace Transforms or Matrix Algebra	4
IME-351	Engineering Economics	4
IME-361	Lean Work Design	4
Credit Hours		16
Junior I		
CILE-400	Culminating Undergraduate Experience: Thesis	4
Advanced Humanities or Social Science Elective		4
PHYS-224	Electricity and Magnetism (Advanced Communications Elective)	3

PHYS-225	Electricity and Magnetism Laboratory	1
MECH-210	Statics	4
IME-321	Operations Research - Deterministic Models	4
IME-332	Engineering Statistics (Advanced Communications Elective)	4
Credit Hours		24
Junior II		
Advanced Humanities or Social Science Elective		4
Technical Elective		4
IE Program Elective (Ergonomics, Manufacturing, or Quality & Statistics)		4
IME-452	Production System Design	4
Credit Hours		16
Senior I		
Math or Science Elective		4
Technical Elective		4
IME-422	Simulation	4
IME-453	Supply Chain Design	4
LS-489	Senior Seminar: Leadership, Ethics, and Contemporary Issues	4
Credit Hours		20
Senior II		
Advanced Humanities or Social Science Elective		4
IE Program Elective (Ergonomics, Manufacturing, or Quality & Statistics)		4
IE Program Elective (Ergonomics, Manufacturing, or Quality & Statistics)		4
IME Elective		4
Free Elective		4
Credit Hours		20
Senior III		
Advanced Humanities or Social Science Elective		4
IME Elective		4
Free Elective		4
IME-454	Senior Design Project	4
Credit Hours		16
Total Credit Hours		161

(Minimum) Total Credits Required for Program: 161