

# Department of Industrial and Systems Engineering

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Industrial and systems engineering (ISE) is the application of engineering methods and the principles of scientific management to the design, improvement, and installation of integrated systems of people, materials, information, equipment, and energy. The industrial and systems engineer is concerned with the design of total systems, and is the leader in the drive for increased productivity and quality improvement.

The ISE profession uses a variety of specialized knowledge and skills. These include communications, economics, mathematics, physical and social sciences, together with the methods of engineering analysis and design.

The ISE is often involved in designing or improving major systems that encompass the total organization. Consequently, he/she is often in contact with individuals from many segments of the organization. From his/her education and these experiences, the ISE develops a global view of the many inter-related operations necessary to deliver a firm's goods and services. Because of their management skills and global view of the organization, a large proportion of ISEs move into management, and later advance into top management positions.

Although ISE is especially important to all segments of industry, it is also applied in other types of organizations, such as transportation, health care, public utilities, agriculture, defense, government, merchandising, distribution, logistics, and other service sectors. With increasing emphasis on quality and productivity for successful international competition, ISEs remain in demand.

The objectives of the Department of Industrial and Systems Engineering are founded in Mississippi State University's educational philosophy and in the ISE profession. They were developed to satisfy the needs of the department's constituents: employers, alumni, faculty, and the ISE profession.

The ISE program aim is to graduate students having a broad and practical education, with emphasis in industrial and systems engineering fundamentals and practices, which enables them to function effectively in systems involving people, materials, information, energy, and money.

The four educational objectives of the Bachelor of Science degree in Industrial Engineering are stated below.

1. Graduates of the Department of Industrial and Systems Engineering are versed in math, science, and engineering theory, know how to apply that theory, and are capable of functioning effectively producing solutions in a broad range of organizations.
2. Graduates of the Department of Industrial and Systems Engineering lead and interact cooperatively in professional situations with individuals having diverse backgrounds, cultures, training, education, and interests.
3. Graduates of the Department of Industrial and Systems Engineering think independently, critically examine ideas, and make discerning professional judgments, whether intellectual, ethical, or aesthetic.
4. Graduates of the Department of Industrial and Systems Engineering are professionally mature, responsible, and informed citizens who pursue lifelong learning.

Because of the importance of systems design in the many facets of ISE, instruction of the principles and methods of design is integrated throughout the ISE curriculum of industrial engineering, and culminates in a major design experience in the student's senior year.

The Industrial Engineering Program is accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org>.

## Engineering Leadership Excellence Program (dual degree program with ISE and Business Administration)

The Bagley College of Engineering and College of Business jointly offer a dual degree program that facilitates the completion of the B.S. in Industrial Engineering and the B.B.A. in Business Administration in four and one-half years of coursework. This program combines an ABET accredited degree in engineering with an AACSB accredited degree in business. Graduates of the dual degree program are better positioned to advance toward management positions in the industrial engineering field. Students in the dual degree program must maintain a 2.5 GPA to remain in the program.

## Degree Requirements

### English Composition

EN 1103	English Composition I	3
or EN 1104	Expanded English Composition I	
EN 1113	English Composition II	3
or EN 1173	Accelerated Composition II	

### Mathematics

Math and Basic Science		15
MA 1713	Calculus I	9
		3

MA 1723	Calculus II	3
MA 2733	Calculus III	3
MA 3113	Introduction to Linear Algebra	3
MA 2743	Calculus IV	3
<b>Natural Sciences</b>		
CH 1213	Chemistry I	3
CH 1211	Investigations in Chemistry I	1
CH 1223	Chemistry II	3
PH 2213	Physics I	3
PH 2223	Physics II	3
<b>Humanities</b>		
See General Education courses		6
<b>Fine Arts</b>		
See General Education courses		3
<b>Social/Behavioral Sciences</b>		
PSY 1013	General Psychology	3
EC 2123	Principles of Microeconomics	3
<b>Major Core</b>		
Math/Science Elective <sup>1</sup>		3
Engineering Topics		12
EM 2413	Engineering Mechanics I	
Engineering Science Elective <sup>2</sup>		
Engineering Science Elective <sup>2</sup>		
Computer Programming Elective <sup>3</sup>		
IE Topics		52
IE 1313	Lean Works Systems	
IE 3123	Industrial Ergonomics	
IE 3323	Manufacturing Processes	
IE 3913	Engineering Economy I	
IE 4333	Production Control Systems I	
Engineering Management Elective <sup>4</sup>		
IE 4543	Logistics Engineering	
IE 4613	Engineering Statistics I	
IE 4623	Engineering Statistics II	
IE 4653	Industrial Quality Control	
IE 4733	Linear Programming	
IE 4753	Systems Engineering and Analysis	
IE 4773	Systems Simulation I	
IE 4914	Industrial Systems Design	
IE 4933	Information System in Industrial Engineering	
IE Design Elective <sup>5</sup>		
IE Design Elective <sup>5</sup>		
<b>Other</b>		<b>12</b>
GE 3513	Technical Writing	
ACC 2023	Principles of Managerial Accounting	
Professional Enrichment Elective <sup>6</sup>		
Approved Elective <sup>7</sup>		
<b>Total Hours</b>		<b>128</b>

<sup>1</sup> Math/Science Elective: MA 3053 Foundations of Mathematics, MA 3253 Differential Equations I, MA 4143 Graph Theory, MA 4313 Numerical Analysis I, MA 4533 Introduction to Probability and Random Processes, ST 4213 Nonparametric Methods, PH 2233 Physics III, CH 2313 Analytical Chemistry I, BIO 1134 Biology I, GG 4153 Engineering Geology, GG 4233 Applied Geophysics

<sup>2</sup> Engineering Science Electives: See academic advisor for list of approved Engineering Science electives

- 3 Computer Programming Elective: CSE 1233 Computer Programming with C or CSE 1284 Introduction to Computer Programming
- 4 Engineering Management Elective: IE 4513 Engineering Administration or IE 4533 Project Management
- 5 IE Design Elective: Any three-hour non-required industrial engineering course
- 6 Professional Enrichment Elective: Appropriately titled, the purpose of this elective is to aid students in the enrichment of their undergraduate program in a professional manner. The intent is to help students achieve objectives such as earning a minor or a certificate, preparing for the F.E. Exam, participating in the Study Abroad Program, or additional study in technical, primarily upper-division areas of study.
- 7 Approved Elective: Students may choose nearly any course or combination of courses totaling three credit hours or more offered at MSU for the Approved Elective. The only exception is that students may not choose remedial courses (courses which are prerequisite to required or previously completed courses), LSK courses, and physical education courses outside of varsity sports. Examples of courses that would directly benefit ISE students include: Engineering Graphics, Foreign Language, Finance, Marketing, Engineering Entrepreneurship, etc.

Industrial engineering is an academic discipline with applicability to a broad range of students from other majors. Engineering majors specifically may wish to complement their degree programs with a minor in industrial engineering to demonstrate knowledge and competence in industrial engineering areas. Completion of the minor requirements should prepare students to apply fundamental principles of industrial engineering, such as production control, operations improvement, and engineering management, to their chosen career field.

Only students with the Bagley College of Engineering are eligible for a minor in industrial engineering. Students majoring in industrial engineering are not eligible.

A minor in industrial engineering consists of three required courses for all student pursuing the minor and two restricted elective courses.

**Required Courses**

IE 3913	Engineering Economy I	3
IE 4613	Engineering Statistics I	3
IE 4333	Production Control Systems I	3

**Students will select two of the following:**

IE 3123 & IE 3121	Industrial Ergonomics and Industrial Ergonomics Laboratory	4
IE 4113	Human Factors Engineering	3
IE 4173	Occupational Safety Engineering	3
IE 4513	Engineering Administration	3
IE 4533	Project Management	3
IE 4543	Logistics Engineering	3
IE 4553	Engineering Law and Ethics	3
IE 4573	Process Improvement Engineering	3
IE 4653	Industrial Quality Control	3
IE 4733	Linear Programming	3
IE 4753	Systems Engineering and Analysis	3

**Total Hours** **15-16**

**Degree Requirements**

**English Composition/Communication**

EN 1103	English Composition I	3
EN 1113	English Composition II	3
CO 1003 or CO 1013	Fundamentals of Public Speaking Introduction to Communication	3
GE 3513	Technical Writing	3

**Mathematics/Science** **15**

MA 1713	Calculus I	3
MA 1723	Calculus II	3
MA 2733	Calculus III	3
MA 2743	Calculus IV	3
MA 3113	Introduction to Linear Algebra	3
CH 1213	Chemistry I	3
CH 1211	Investigations in Chemistry I	1
CH 1223	Chemistry II	3

PH 2213	Physics I	3
PH 2223	Physics II	3
Math/Science elective		3
<b>Social/Behavioral Sciences</b>		
EC 2113	Principles of Macroeconomics	3
EC 2123	Principles of Microeconomics	3
PS 1113	American Government	3
<b>Humanities</b>		
See General Education courses		6
<b>Fine Arts</b>		
See General Education courses		3
<b>Major Core (from both IE and Bus Admin)</b>		
ACC 2013	Principles of Financial Accounting	3
ACC 2023	Principles of Managerial Accounting	3
MKT 3013	Principles of Marketing	3
MKT 3323	International Logistics	3
MKT 4313	Physical Distribution Management	3
MKT 4333	International Supply Chain Management	3
FIN 3123	Financial Management	3
BL 2413	The Legal Environment of Business	3
EM 2413	Engineering Mechanics I	3
IE 1313	Lean Works Systems	3
IE 3123	Industrial Ergonomics	3
IE 3323	Manufacturing Processes	3
IE 4333	Production Control Systems I	3
IE 4513	Engineering Administration	3
IE 4533	Project Management	3
IE 4613	Engineering Statistics I	3
IE 4623	Engineering Statistics II	3
IE 4653	Industrial Quality Control	3
IE 4733	Linear Programming	3
IE 4753	Systems Engineering and Analysis	3
IE 4773	Systems Simulation I	3
IE 4914	Industrial Systems Design	4
IE 4933	Information System in Industrial Engineering	3
BIS/MGT/Law/BQA/Entrepreneurship Course		3
Computer Programming Elective		3
Engineering Science Elective		6
<b>Total Hours</b>		<b>143</b>