

k-state

study guide

kansas state university

Industrial and Manufacturing Systems Engineering

Industrial and manufacturing systems engineers design, analyze, and improve production systems. Where other engineers design products, IEs design processes to make goods and provide services. They work with people at all levels of an organization and are more business- and people-oriented than other engineers.

A good product design is just one element of a successful business. To be successful, an organization must choose the right materials, have the right mix of properly trained people, and use appropriate technology and the best methods to produce the highest quality goods and services at the lowest possible cost.

IEs use computers, mathematics, science, problem solving, and engineering skills to solve complex business problems. They work in manufacturing, health care, transportation, financial organizations, communications, government, military, and consulting.

Career opportunities

IE graduates are in demand by Kansas, Midwestern, national, and international organizations. Most students have job offers before they graduate.

Some companies that have recruited our graduates in the past few years include Accenture; Altec Industries, Inc.; Becton, Dickinson and Company; Black & Veatch; Blue Cross and Blue Shield; Caterpillar; Cerner; Cessna; ConAgra Foods; Deloitte Consulting LLP; ExxonMobil; General Electric; General Mills; Halliburton; Hormel Food; Honeywell; IBM; JCPenney; John Deere; Koch Industries; Lockheed Martin; PepsiCo; Procter & Gamble; Raytheon; Reinke Manufacturing; Sprint; Burlington Northern-Santa Fe Railway; United Parcel Service; and Yellow Transportation.

The average annual starting salary for IMSE graduates is more than \$60,000. Because of their ability to see system-wide problems and solutions, graduates move quickly into management positions.

IMSE curriculum

The industrial engineering curriculum is based on a strong background in mathematics and science. In our curriculum, the first two academic years are used to build the knowledge and experience base necessary for our students to learn and apply fundamental engineering concepts and principles. Courses within the major are a blend of engineering, management, and business topics. Our courses are taught almost exclusively by faculty. IE class size is typically fewer than 30 students.

We emphasize teamwork and group projects in our learning experience that help develop skills necessary for success in today's work environment.

Areas of specialization

Students may choose an area of emphasis in any areas listed below by selecting appropriate IMSE electives.

Engineering management

Management of engineering or highly technical organizations. Effective resource utilization. Includes the management of money, people, and equipment.

Ergonomics

Study of human characteristics for the appropriate design of tools, devices, equipment, machines, controls, workstations, and environment to minimize human operator stress and fatigue and improve productivity.

Manufacturing engineering

The design, analysis, and implementation of systems to manufacture products.

Operations research

The application of mathematical models to analyze complex problems and develop optimum solutions.

Minor

A minor in manufacturing systems is also available. It requires 16 credit hours: four core courses and at least one course from the manufacturing systems elective course list. A course list is available in the online catalog at www.catalog.k-state.edu. Look under the College of Engineering.

Concurrent BS/MS

The industrial engineering department offers a concurrent BS/MS degree program in which high-performing students can earn bachelor's and master's degrees at the same time. Students choose between completing a thesis or pursuing a course work-only option.

To apply for the program, the student must have a cumulative GPA of at least 3.25 after having completed 80 credit hours toward the industrial engineering degree. Graduates typically complete both degrees in about one calendar year beyond the time it would take to complete the bachelor's alone. Interested students should contact the department head for additional information.

Student activities

All students are encouraged to join the student chapters of the Institute of Industrial Engineers and/or the Society of Manufacturing Engineers. The student chapters organize a number of activities promoting academic and social interaction between the members. The chapters host field trips, student/faculty picnics, and mentor day; organize displays at K-State Open House; and participate at the Technical Paper Conference and other interesting activities.

Bachelor of science in industrial engineering

127 hours required for graduation

Freshman

Hrs. Fall semester

4	MATH 220	Analytic Geometry and Calculus I
4	CHM 210	Chemistry I
3	ENGL 100	Expository Writing I*
3	IMSE 201	Introduction to Industrial Engineering
3	Humanities or social science elective	
0	IMSE 015	Engineering Assembly
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Hrs. Spring semester

2	IMSE 250	Introduction to Manufacturing Processes
1	IMSE 251	Introduction to Manufacturing Processes Lab
4	MATH 221	Analytic Geometry and Calculus II
3	ECON 120	Principles of Microeconomics
2	ME 212	Engineering Graphics
3	ACCTG 231	Accounting for Business Operations
2	COMM 105	Public Speaking 1A
0	IMSE 015	Engineering Assembly
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Sophomore

Hrs. Fall semester

4	MATH 222	Analytic Geometry and Calculus III
3	STAT 510	Introduction to Probability and Statistics I
5	PHYS 213	Engineering Physics I
0	IMSE 015	Engineering Assembly
3	Humanities UGE elective (300 level or above)	
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Hrs. Spring semester

3	MATH 551	Applied Matrix Theory
3	STAT 511	Introduction to Probability and Statistics II
5	PHYS 214	Engineering Physics II
3	IMSE 530	Engineering Economic Analysis
0	IMSE 015	Engineering Assembly
3	Social science UGE elective (300 level or above)	
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Junior

Hrs. Fall semester

3	IMSE 560	Operations Research I
3	IMSE 541	Statistical Quality Control
3	MGMT 420	Management Concepts
0	IMSE 015	Engineering Assembly
3	Computer programming elective	
3	Engineering elective	
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Hrs. Spring semester

3	IMSE 660	Operations Research II
3	ENGL 415	Written Communication for Engineers
0	IMSE 050	Industrial Plant Studies
0	IMSE 015	Engineering Assembly
3	IMSE elective	
3	Professional elective	
3	Engineering elective	
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Senior

Hrs. Fall semester

3	IMSE 623	Industrial Ergonomics
3	IMSE 633	Production Planning and Inventory Control
3	IMSE 643	Industrial Simulation
0	IMSE 015	Engineering Assembly
3	Professional elective	
3	Engineering elective	
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Hrs. Spring semester

4	IMSE 580	Manufacturing System Design and Analysis
3	IMSE 685	Manufacturing Information Systems
3	IMSE 555	Industrial Facility Layout and Design
0	IMSE 015	Engineering Assembly
3	IMSE elective	
3	Professional elective	
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IMSE curriculum notes

Computer programming elective: The computer programming elective consists of 3 hours taken from CIS 200, CIS 209 or ME 400.

Engineering electives: The 9 hours of basic engineering credit may not include more than 6 hours from a single department, and the 9 hours must be selected from the following courses. Note, students planning to take the FE exam would be advised to take their 9 hours from classes with an *. BAE 350; CE 333, 530*, and 533; CHE 350, 352*, 520, and 521; ECE 410, 511, 519*, and 571; ME 512*, 513, 571, and 573.

Professional electives: The 9 hours of professional electives are designed so that the student may specialize in an area of interest. Any of the following classes may count toward the professional elective requirement: any IMSE class; any engineering class above 300; any CIS class above 200; Math 240 and any mathematics class above 500 except MATH 570 and 591; any statistics class above 500 except STAT 702, 703, 706, and 710; BIO 198 and 201; CHEM 230; FINAN 450, 510, 520, and 643; ACCTG 331, 342, and 433; ECON 510, 520, 530, and 540.

IMSE electives: The IMSE electives must be selected from the IMSE department. Each class must also be at least 3 credit hours.

Substitutions: IMSE 501 can substitute for MGMT 420; IMSE 591 and IMSE 592 can substitute for IMSE 580. Concurrent or prerequisite requirements for IMSE 591 are 24 credit hours of IMSE 500-level and above courses.

Humanities and social science UGE electives: Electives are to be selected from the catalog list and must satisfy university general education requirements.

IMSE assembly requirement: Each semester a student must enroll in IMSE 015 unless you are a concurrent BS/MS student, in which case you must enroll in either IMSE 015 or IMSE 892.

*Prerequisite for ENGL 415 is a B or better in ENGL 100. ENGL 200 must be taken if ENGL 100's grade was a C or lower.

For more information about industrial or manufacturing systems engineering contact:

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For more information about Kansas State University, contact:

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119 Anderson Hall
Manhattan, KS 66506-0102
1-800-432-8270 (toll free) or
785-532-6250

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consider.k-state.edu



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