

Industrial Engineering B.S.



Contact Information

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Faculty

Ervin Pietz Professor Kellogg, Chair; Professor Kerk; Associate Professor Matejcik; Assistant Professors Karlin and Jensen.

The bachelor of science program in industrial engineering is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

Industrial engineering is concerned with the design, improvement, and installation of integrated systems of people, material, and equipment. The industrial engineer employs a set of skills that includes mathematical modeling, probability and statistics, computer science, human factors, and interpersonal skills. Thus, industrial engineering may be thought of as applied problem solving, from inception to implementation.

Industrial Engineering Program Objectives

The objectives of the industrial engineering program are to produce graduates who:

- contribute to the success of companies through

effective problem solving.

- design, develop, implement, and improve integrated systems that include people, materials, information, equipment, and environments.
- effectively manage business operations and project management teams.
- continue to develop the personal and professional skills necessary to adapt to our changing societal, technological, and global environments.

Graduates of the industrial engineering program are expected to be competent for entry level professional practice and will:

- possess basic scientific and mathematical competence.
- be able to conduct experiments and analyze data.
- have technical and computer competence.
- be able to communicate effectively.
- be able to work effectively on a professional team.
- understand business and management functions.
- be able to design a system.
- have an understanding of professional and ethical responsibility.

Industrial Engineering Education

The curriculum in the industrial engineering department is designed to give the student a thorough knowledge in the fundamental principles within the four primary stems of industrial engineering: operations research and optimization, manufacturing, statistical processes, and human engineering. Throughout the program of studies, special emphasis is placed upon application of

systems principles in engineering design to assure proper integration of the individual (or individuals), procedures, materials, and equipment. Service learning components, laboratories, case work, simulations, and the capstone design sequence reinforce the managerial aspects of systems integration, systems design, and the global, societal, and business context for product and process improvement.

Students may participate in the Cooperative Education Internship Program. The co-op credits may count as approved engineering elective courses.

Industrial Engineering Laboratories

The Human Engineering Laboratory supports the minor in occupational safety and courses in work methods and measurement, ergonomics/human factors engineering, safety engineering, and industrial hygiene. Laboratories typically include an enterprise team or service learning component that provide real world work experience. The Computer Integrated Manufacturing Laboratory supports the computer controlled manufacturing course. Using state of the art equipment, students will utilize robots, material handling equipment, and computer numerically controlled machinery to design and fabricate a finished product. The Operational Strategies laboratory complements computer aided manufacturing but allows student to simulate large production systems to explore flexible manufacturing systems and strategies for lean manufacturing.

Minor in Occupational Safety

The minor in occupational safety is offered to students pursuing any B.S. degree program. Minimum math/science competence is CHEM 112/112L, MATH 123, PHYS 111 or 211, and MATH 281 or 381 or 441. Required courses are IENG 321/331/341, PSYC 331 or POLS 407, Senior Design or Senior Project I in home department, and a minimum of 6 credit hours from the following list: BIOL 121/121L/123/123L, ENVE 326, CHEM

114/114L, CHEM 480, CP 297/397/4971, IENG 4911, ME 380, MEM 203, PE 105, and PHYS 363. (Note 1: Pre-approved, significant safety content.) Thus, a total of at least 21 credit hours is needed for an occupational safety minor. A minor in occupational safety must be approved by the student's major department and the minor coordinator on a form available at the Office of Academic and Enrollment Services. Additional information may be found at the department website: <<http://ie.sdsmt.edu>>.

Certificate Programs

Students may elect to add value to their transcript via certificate program offerings in Six Sigma and Engineering Management. The Six Sigma program provides the necessary components and training for greenbelt certification desired by industry. Students will gain an exposure to the six sigma quality management philosophy culminating in a project application of quality by design. The Engineering Management program provides students an opportunity to complement their technical skills with the modern management techniques, organizational theory, and change management practices required to effectively manage technical industries. Additional information may be found at the department website: <<http://ie.sdsmt.edu>>.

Industrial Engineering Curriculum/Checklist

It is the student's responsibility to check with his or her advisor for any program modifications that may occur after the publication of this catalog.

		<u>Freshman Year</u>
First Semester		
MATH 123	Calculus I	4
CHEM 112	General Chemistry I	3
Humanities or Social Sciences Elective(s)		3
PE	Physical Education ¹	1
ENGL 101	Composition I	3
CHEM 112L	General Chemistry I Lab	1
ME 110	Intro to Mechanical Engr	2
OR		
CEE 117	Computer Aided Design	2
TOTAL		17

Second Semester		
MATH 125	Calculus II	4
PHYS 211	University Physics I	3
PE	Physical Education I	1
PSYC 101	General Psychology	3
	General Elective	2
	Humanities or Social Sciences Elective(s)	3
TOTAL		16

Sophomore Year

First Semester		
EM 216	Statics and Dynamics	4
ENGL 279	Technical Communications I	3
MATH 225	Calculus III	4
IENG 381	Intro to Probability and Stats	3
PHYS 213	University Physics II	3
PHYS 213L	University Physics II Lab	1
TOTAL		18

Second Semester		
IENG 382	Probability Theory and Stats II	3
MATH 321	Differential Equations	4
IENG 215/216/217	Cost Estimating for Engineers	3
IENG 241	Production Tools for Quality Improvement	2
IENG 302	Engineering Economics	3
	Humanities or Social Sciences Elective(s)	3
TOTAL		18

Junior Year

First Semester		
ENGL 289	Technical Communications II	3
IENG 311	Work Methods and Measurement	3
IENG 486	Statistical Quality and Process Control	3
IENG 345	Entrepreneurship	4
IENG 362	Stochastic Models	3
	Humanities or Social Sciences Elective(s)	1
TOTAL		17

Second Semester		
IENG 441	Simulation	3
MATH 353	Linear Optimization	3
IENG 321	Ergonomics/Human Factors	

	Engineering	3
EE 301	Intro Circuits, Machines, Syst	4
MET 232	Properties of Materials	3
TOTAL		16

Senior Year

First Semester		
IENG 425	Production and Operation	3
IENG 331	Safety Engineering ²	3
IENG 471	Facilities Planning	3
IENG 464	Senior Design Project I	3
	Dept. Approved Electives	6
TOTAL		18

Second Semester		
IENG 366	Management Processes	3
IENG 465	Senior Design Project II	3
IENG 475	Computer Controlled Manuf	3
	Humanities or Social Sciences Elective(s)	3
	Department Elective	4
TOTAL		16

136 credits required for graduation

Curriculum Notes

¹ Music ensemble courses may be substituted for physical education courses for qualified students. Any other substitutions must be approved in advance by the physical education department chair.

²IENG 341 (Industrial Hygiene) may be substituted during a second semester.

Elective courses must be chosen to satisfy all of the following requirements:

1. Sixteen (16) semester hours in humanities or social science. At least six (6) hours must be in humanities and at least six (6) hours must be in social sciences. This may include PSYC 101, which is required.
2. Six (6) hours of humanities or social science must be included in the list of approved cultural diversity courses.
3. At least three (3) hours of humanities or social science must be at the 300 or 400 level.