

Industrial Engineering and Engineering Management B.S.



Contact Information

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Faculty

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Industrial engineering and engineering management is concerned with the design, improvement, installation, and management of integrated systems of people, material, and equipment. Graduates of the program employ a set of skills that includes mathematical modeling, probability and statistics, computer science, human factors, interpersonal skills, project management, and an ability to manage and administer large technical engineering and research projects. Thus, industrial engineering and engineering management may be thought of as applied problem solving, from inception to implementation and management.

Program Objectives

The objectives of the industrial engineering and engineering management 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 and engineering management program are expected to be competent for entry-level professional practice and possess basic scientific and mathematical competence, be able to solve engineering problems, have the appropriate skills for contemporary engineering practice, and develop holistically as a learner.

Education

The curriculum is designed to give students 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. In addition, through a variety of course work and experiential learning activities, students develop an understanding of the engineering relationships with the management tasks of planning, leading, organizing, and controlling as well as the integrative nature of management systems.

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.

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 modern 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 students 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. The minimum math and science course requirements are 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 in home department, and a minimum of 6 credit hours: BIOL 121/121L/123/123L, ENVE 7326, 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 the Registrar and Academic 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 Greenbelt, Engineering Management and Leadership, and Technology Innovation. The Six Sigma Greenbelt 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 and Leadership program provides students an opportunity to complement their technical skills with modern management techniques, organizational theory, and change management practices required to effectively manage technical industries. The Technology Innovation certificate provides students with a value-added curriculum in creativity and innovation, product development, and business and entrepreneurial functions. Additional information may be found at the department web site: <<http://ie.sdsmt.edu>>.

Industrial Engineering Curriculum/Checklist

Students are responsible for checking with their advisors for any program modifications that may occur after the publication of this catalog.

Freshman Year

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
	Engineering Fundamentals Elective	3
	Humanities or Social Sciences Elective(s)	3
TOTAL		17

Sophomore Year

First Semester

	Engineering Fundamentals Elective	3
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		17

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 352	Creativity and Innovation	1
IENG 354	Marketing Technology Innovations	1

IENG 362	Stochastic Models	3
	Humanities or Social Sciences Elective(s)	1
	Professional Breadth Elective	3
TOTAL		18

Second Semester

IENG 355	Financing Technology Innovations	1
IENG 441	Simulation	3
MATH 353	Linear Optimization	3
IENG 321	Ergonomics/Human Factors Engineering	3
	Engineering Fundamentals Elective	3
	Professional Breadth Elective	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	2
IENG 462	Industrial and Engineering Management Profession	1
	Professional Breadth Elective	6
TOTAL		18

Second Semester

IENG 366	Engineering Management	3
IENG 465	Senior Design Project II	3
IENG 475	Computer Controlled Manuf.	3
	Humanities or Social Sciences Elective(s)	3
	Department Elective	3
TOTAL		15

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 head.

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 semester hours in humanities or social science. At least 6 hours must be in humanities and at least 6 hours must be in social sciences. This may include PSYC 101, which is required.

2. Six hours of humanities or social science must be included in the list of approved cultural diversity courses.

3. At least 3 hours of humanities or social science must be at the 300 or 400 level.

A. Department Electives (3 credits)

- Human Engineering (3 credits) IENG 331 or 431
- Department Breadth IENG 451, 452, 466, 491, or 492

B. Engineering Fundamentals (11 credits)

- Graphics (2 credits) ME 110 or CEE 117
- Fundamentals (9 credits from at least two different areas)
- Materials MET 231, MET 232, or MET 233
- Circuits EE 301 or EE 220
- Statics/Dynamics EM 214, EM 215, EM 216, or ME 221
- Thermodynamics ME 211, ME 331, MeT 320 or ChE 222
- Fluid Mechanics EM 327, EM 328, or EM 331
- Mechanics ME 216 or EM 321

C. Professional Breadth (12 credits)

- Courses in A beyond 3-credit requirement
- Courses in B beyond 11 credit requirement
- Engineering Breadth
- ME 262
- CENG 244
- GEOE 211
- CSC 150, CSC 251
- Transport phenomena ChE/EnvE 218, EnvE 315, ChE 317, ChE/EnvE 318,
- MET 422
- Mathematics Breadth
- Math 315 Linear Algebra

- Math 373 Numerical Analysis
- Math 423 Advanced Calculus
- Math 431 Dynamical Systems
- Math 451 Mathematical Modeling
- Math 447 Design of Experiments
- Science Breadth
- GEOL 201
- GEOE 221
- BIOL 121, 121L
- BIOL 123, 123L
- BIOL 151, 151L
- BIOL 153, 153L
- CHEM 114, 114L
- CHEM 326, 326L
- CHEM 328, 328L
- Organizational Management Breadth
- PSYC 331
- TM xxx
- ACCT 210, 211
- BADM 350
- BADM 370
- BADM 407
- ECON 201, 202
- Petitioned Courses