

# Industrial Engineering



## Career Profile

Industrial engineers are concerned with the design, improvement, and installation of integrated systems of people, material, and equipment. It helps bridge the gap between management and operations; integrating the human resources, raw materials, and equipment components of business and manufacturing. Industrial engineers work with people in addition to solving technical problems.

Industrial engineers employ a set of skills that includes mathematical modeling, probability and statistics, computer science, human factors, and interpersonal skills. There are industrial engineers in banks, hospitals, all levels of government, transportation, construction, processing, social service, electronics, facilities design, service industry, defense, agribusiness, and many other organizations.

## Accreditation

The South Dakota School of Mines and Technology is accredited by the Higher Learning Commission of the North Central Association of Colleges and Secondary Schools, the recognized accrediting agency for the north central states. In 2006, the HLC voted to continue accreditation of the School of Mines. The School of Mines has been accredited since 1925.

The industrial engineering program is also accredited by the Engineering Accreditation Commission of ABET, Inc.

## Faculty

Chair: Ervin Pietz Professor Dr. Stuart Kellogg  
Professor: Dr. Carter Kerk  
Associate Professor: Dr. Frank Matejczik  
Assistant Professors: Dr. Dean Jensen and Dr. Jennifer Karlin

## Labs and Facilities

Laboratories are available for courses in work methods and measurements, and in human factors and ergonomics. To respond to changing industrial requirements, a new, state-of-the-art computer integrated manufacturing laboratory has been established. The major amount of laboratory activity, however, is involved in the senior design courses. As often as possible, these design projects utilize the facilities of local

industries, service organizations, governmental agencies, and other types of business. In addition, modern computing facilities and up-to-date industrial software is used for many of the courses.

## Features and Strengths

The program provides the student with high-quality education and an excellent atmosphere in which to learn. The low student-to-faculty ratio reinforces the learning environment between the student and the professor. There are many laboratory classes that provide students with experience in work measurement, human factors and ergonomics, facilities design, computer application, and production control.

## Program Overview

Throughout the program of study, special emphasis is placed upon application of systems principles to ensure proper integration of people, procedures, materials, and equipment. This includes formal course work on entrepreneurial concepts, modern management principles, and on a two-semester senior design project.

Industrial Engineering students will:

- solve problems using math, physics, operations research, probability and statistics, and simulation.
- design, develop, implement, and improve integrated systems that include people, materials, information, equipment, and energy.
- work effectively on multi-disciplinary teams.
- communicate effectively to a broad spectrum of technical and non-technical audiences.
- assume leadership roles by understanding and applying current management techniques, and by coordinating the various business and engineering functions.

## Outcomes

- School of Mines industrial engineering graduates received salary offers that average more than \$50,000.
- 100 percent of 2005-06 School of Mines industrial engineering graduates were placed in their field or entered a graduate program within a year of graduation.
- 80 percent of graduates gain real-life experience through internships and co-ops.
- Companies hiring industrial engineering graduates include UPS, Raytheon, Boeing, Caterpillar, and IBM.

## Student Organizations

Students at the School of Mines also have a variety of opportunities for extra-curricular activities that range from music, intramurals, and drama to ski and snowboarding clubs, and more than 75 other clubs and professional student organizations. These are important activities for our students and we encourage them to take full advantage of out-of-classroom events. In particular, industrial engineering majors are encouraged to participate in the student chapter of the Institute of Industrial Engineers. Other opportunities that are available include the Center for Advanced Manufacturing and Production (CAMP), Engineers without Borders, Research Experience for Undergraduates (REU), undergraduate research projects, Co-op and Internships, and Student Innovators for Free Enterprise (SIFE).

## Research

Research in the industrial engineering department includes studies of colleges of engineering as learning organizations, funded by the National Science Foundation; aging equipment facilities design for the USAF, statistical process control, computer aided manufacturing, operations, human engineering, and engineering education.

# Curriculum Listing

<http://catalog.sdsmt.edu>

## INDUSTRIAL ENGINEERING CURRICULUM/CHECKLIST

### 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 <sup>1</sup>	1
ENGL 101	Composition I	3
CHEM 112L	General Chemistry I Lab	1
PSYC 101	General Psychology	3
<b>TOTAL</b>		<b>18</b>

#### Second Semester

MATH 125	Calculus II	4
PHYS 211	University Physics I	3
PE	Physical Education <sup>1</sup>	1
ME 110	Intro to Mechanical Engr	2
	Humanities or Social Sciences Elective(s)	3
	General Elective <sup>2</sup>	2
<b>TOTAL</b>		<b>16</b>

### 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
<b>TOTAL</b>		<b>18</b>

#### Second Semester

IENG 382	Probability Theory and Stats II3	
MATH 321	Differential Equations	4
IENG 215/216/217	Cost Estimating for Engineers	3
IENG 302	Engineering Economics	3
	Department Elective	3
	Humanities or Social Sciences Elective(s)	3
<b>TOTAL</b>		<b>19</b>

### JUNIOR YEAR

#### First Semester

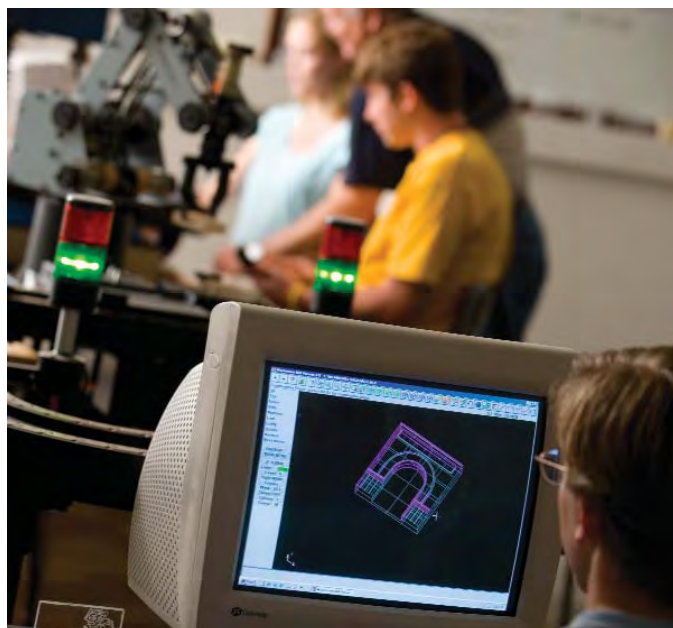
ENGL 289	Technical Communications II	3
IENG 311	Work Methods and Measurement	3
IENG 486	Statistical Quality and Process Control	3
IENG 345	Entrepreneurship	4
IENG 362	Stochastic Models	3
	Humanities or Social Sciences Elective(s)	2
<b>TOTAL</b>		<b>18</b>

#### 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
<b>TOTAL</b>		<b>16</b>

### For More Information contact:

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### SENIOR YEAR

#### First Semester

IENG 425	Production and Operation	3
IENG 331	Safety Engineering <sup>2</sup>	3
IENG 471	Facilities Planning	3
IENG 464	Senior Design Project I	3
	Dept. Approved Electives	6
<b>TOTAL</b>		<b>18</b>

#### 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)	2
	Department Elective	3
<b>TOTAL</b>		<b>14</b>

### 136 credits required for graduation

#### Curriculum Notes

<sup>1</sup> 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.

<sup>2</sup>IENG 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.