

Chemical Engineering



Career Profile

Chemical engineers apply chemistry, biology, and engineering principles to the solution of a wide variety of globally important problems. From producing pharmaceuticals for human needs to recycling plastic, chemical engineers work to find creative solutions to some of the most pressing problems of our times. Chemical engineers design and optimize processes for clean energy, for new materials for electronic applications, and for providing basic chemicals at a reasonable cost in the safest manner.

A chemical engineering degree prepares students to pursue graduate study in medicine, materials science, patent or environmental law, or even business administration, in addition to classical chemical engineering.

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 chemical engineering curriculum is also accredited by the Engineering Accreditation Commission of ABET, Inc.

Labs and Facilities

The chemical engineering program has laboratory facilities that enhance the concepts you learn in the classroom. These facilities include the main laboratory that houses miniplant equipment such as

a distillation column, evaporators, heat exchangers, a gas absorber, and others that mimic what is found in industry. Other laboratories include a process control laboratory; a biochemical engineering laboratory to study the production of fuels, chemicals, foods, and pharmaceuticals; a computer laboratory; state-of-the-art process simulators; and several research laboratories.

The School of Mines is home to the Center for Bioprocessing Research and Development (CBRD), a facility dedicated to biomass and alternative fuel research.

Faculty

Chair: Dr. David Dixon

Professors: Dr. Sookie Bang, Dr. Jan Puszynski, and Dr. Robb Winter

Assistant Professors: Dr. Patrick Gilcrease, Dr. Todd Menkhaus, and Dr. Rajesh Sani

Features and Strengths

The chemical and biological engineering department continues to develop a unique biochemical engineering emphasis. Biochemical engineers apply chemical engineering principles to biological processes used in the agricultural, pharmaceutical, environmental, and specialty chemicals industries. Students who choose biochemical engineering as an option gain intensive hands-on experience with fermentation systems.

Program Overview

Critical analysis of chemical processes, both as an entire process and individual components, is the core of the program. The courses in the curriculum were chosen to develop a well-rounded education, beginning with the foundations of mathematics, physics, biology and chemistry, and culminating with a capstone process design course at the senior level. Along the way, students develop competencies in fluid dynamics, heat transfer, mass transfer, computer solutions to complex engineering problems, process control, kinetics, and reactor design.

Students can obtain a special emphasis in emerging areas such as biochemical engineering, environmental engineering, or advanced materials.

Outcomes

- School of Mines chemical engineering graduates received salary offers that average more than \$59,000.
- 100 percent of 2006-07 School of Mines chemical engineering graduates were placed in their field or have entered a graduate program within three months of graduation.
- 80 percent of graduates gain real-life experience through internships and co-ops.
- Companies hiring chemical engineering graduates include 3M, Cargill, Dow Chemical, and Dow Corning, Broin & Assoc, Dakota Gasification, Coca-Cola, Ecolab, Cyondell, FMC, Halliburton, Hutchinson Tech., Lafarge, Michelin, SD DENR, Tate & Lyle, ADM, USAF, US Navy, and many others.

Student Organizations

Students at the School of Mines also have a variety of opportunities for extra-curricular activities that range from music, intramural sports, 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. Students in chemical engineering are encouraged to join the student chapter of the American Institute of Chemical Engineers.

The Center for Advanced Manufacturing and Production (CAMP) is designed to teach students engineering, science and design skills, as well as the ability to work in teams. Team members design, build, market and raise the money for their projects. All students are welcome to work on CAMP projects, including the ChemE-Car Team.

Research

Students have the opportunity to be involved in cutting-edge research with professors conducting work on projects, such as, development of ultra-lightweight space structures, separation of proteins and chemicals using novel membranes, development of an extended wavelength pulsed laser system, bioremediation of drinking water and ground water systems, formation and processing of nanopowders for energetic and structural applications, bio-enhanced coal-bed methane production, and development of renewable feedstocks for production of bio-ethanol and other bio-refinery products. Funding for these projects comes from sources such as the National Science Foundation, the United States Department of Defense, the United States Department of Energy, the State of South Dakota, local and regional industries, and others.

Curriculum Listing

<http://catalog.sdsmt.edu>

CHEMICAL ENGINEERING CURRICULUM/CHECKLIST

Freshman Year

First Semester

MATH 123	Calculus I	4
CHEM 112	General Chemistry I	3
CHEM 112L	General Chemistry I Lab	1
GE 130	Introduction to Engr.	2
ENGL 101	Composition I	3
Humanities or Social Sciences Elective(s)		5
TOTAL		18

Second Semester

MATH 125	Calculus II	4
CHEM 114	General Chemistry II	3
CHEM 114L	General Chemistry II Lab	1
PHYS 211	University Physics I	3
CHE 111	Intro. Eng. Modeling	1
CHE 117	Prof. Pract. in Chem. Eng.	2
Humanities or Social Sciences Elective(s)		4
TOTAL		18

For More Information contact:

Dr. David Dixon
Chair, Chemical and Biological Engineering
(605) 394-1235
David.Dixon@sdsmt.edu
<<http://cbe.sdsmt.edu>>

Sophomore Year

First Semester

CHE 217	Chemical Engineering I	3
MATH 225	Calculus III	4
ENGL 279	Technical Communications I	3
CHEM 326	Organic Chemistry I	3
CHEM 220L	Exp. Organic Chem. IA	1
PHYS 213	University Physics II	3
TOTAL		17

Second Semester

CHE 218	Chemical Engineering II	3
CHE 222	Chem. Engr. Thermo I	3
CHE 250	Computer App. in Chem. Eng.	2
CHEM 328	Organic Chemistry II	3
MATH 321	Differential Equations	4
Humanities or Social Sciences Elective(s)		3
TOTAL		18

Junior Year

First Semester

CHE 317	Chemical Engr. III	3
CHE 321	Chemical Engr. Thermo II	3
CHE 333	Process Measure and Control	1
CHE 361	Chemical Engr Lab II	2
CHEM 230	Analytical Chem for Engr	2
CHEM 332L	Analytical Chem Lab	1
CHEM 341	Physical Chem for Engr I	2
ENGL 289	Technical Communications II	3
TOTAL		17

Second Semester

CHE 318	Chemical Engineering IV	3
CHE 362	Chemical Engineering Lab III	1
CHE 343	Chem Kinetics/Reactor Dsgn	3
CHEM 343	Physical Chem for Engr II	2
CHEM 345L	Physical Chem I and II Lab	1
Engineering Elective		3
Department Approved Elective		3
TOTAL		16

Senior Year

First Semester

CHE 417	Chemical Engineering V	2
CHE 461	Chemical Engineering Lab IV	1
CHE 464	Chemical Engr Design I	4
Chemical Engineering Elective		3
Biology Elective		3
Humanities or Social Sciences Elective(s)		3
TOTAL		16

Second Semester

CHE 433	Process Control	3
CHE 465	Chemical Engr Design II	3
CHE 487	Global and Contemporary Issues in Chemical Engineering I	
Chemical Engineering Elective		2
Chemical Engineering Lab Elective		1
Department Approved Elective		4
PE	Physical Education/MUEN	2
TOTAL		16

136 credits required for graduation