

# Chemistry (Chem)



## Career Profile

An undergraduate degree in chemistry opens an unparalleled number of doors for graduates. In addition to many job opportunities directly after graduation, many graduates in chemistry pursue graduate degrees to further their knowledge and skills in chemistry. Graduates in chemistry are also highly prized by dentistry, veterinary sciences, chiropractic, law, and medical programs, attesting to the centrality of chemistry and the critical role it plays in society.

## 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.

The chemistry curriculum is also accredited by the American Chemical Society (ACS).

## Faculty

**Chair:** Dr. Dan Heglund, associate professor

**Professor:** Dr. David Boyles

**Associate Professor:** Dr. Hao Fong

**Assistant Professors:** Dr. Justin Meyer and Dr. Zhengtao Zhu

**Instructor:** Ms. Cabot-Ann Christofferson

## Labs and Facilities

The department prides itself in having modern instrumentation available not only for research but as an integral part of undergraduate education. The instrumentation within the department currently includes FT-IR spectrometers, a 300 MHz superconducting heteronuclear nuclear magnetic resonance spectrometer, a spectrofluorometer, diode-array spectrophotometer, gas chromatograph-mass spectrometer, and other instruments.

## Features and Strengths

The department provides a high-quality and competitive education and an atmosphere conducive to student achievement and individuation. Advisors work closely with students to ensure students complete degree requirements, including prerequisites for medical and subsequent

professional schools as chosen by the student, with opportunities available for motivated students including undergraduate research experiences and post-graduation employment. Many undergraduates are eligible to present the results of their research at regional and national conferences.

Being an ACS-approved chemistry department provides a number of benefits. The ACS promotes excellence in chemistry education for undergraduate students through approval of institutions nationwide. ACS approved programs demonstrate significant commitment by the department and university to meet rigorous academic criteria as required by ACS. These programs provide a broad-based and rigorous chemistry education which equips graduates with the knowledge and skills necessary to succeed in chemistry and related fields.

## Program Overview

An undergraduate education in chemistry provides students the knowledge of chemical and physical phenomena at the molecular level. Students gain the skills of critical thinking and chemical problem-solving in all five major sub-disciplines of chemistry: analytical, inorganic, organic, biochemistry, and physical chemistry.

The chemistry curriculum offers a great deal of flexibility in terms of free elective courses to supplement chemical knowledge with a breadth of other courses, including the humanities, social sciences, biological and physical sciences, mathematics, engineering, and others. This allows a student to develop a customizable program that will result in a well-rounded graduate who is able to face and meet the challenges in his or her chosen career.

## Outcomes

- School of Mines chemistry graduates received salary offers that average more than \$50,000.
- 92 percent of 2007-08 School of Mines chemistry graduates were placed in their field or entered a graduate program within a year of graduation.
- 75 percent of graduates gain real-life experience through internships and co-ops.
- Companies hiring chemistry graduates include 3M, Dow Chemical, Celanese, and Cargill.
- Many graduates find chemistry a great preparation for medical, dental, and veterinary schools.

## 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, and more than 75 other clubs and professional student organizations. These are important activities for students and they are encouraged to take full advantage of out-of-classroom events.

Students in chemistry are encouraged to join the Student Affiliates of the American Chemical Society (SA-ACS). Upon graduation, SA-ACS members may join as a full member of the ACS. The ACS is the single largest scientific professional organization in the world. The SA-ACS provides a great way for chemistry students to interact with other chemistry students and the chemistry faculty through numerous activities they host each year. Some students attend national and regional ACS meetings. These meetings provide a great opportunity to share research and interact with both industrial and academic members of the global scientific community.

## Research

Many students take advantage of research opportunities with professors conducting investigations in areas including synthetic organic chemistry, polymer chemistry, computational

chemistry, nanochemistry, and spectroscopy. Undergraduate research may culminate in research reports, presentations, and publications by the student. The department faculty conducts high-caliber research that has been funded by a variety of federal sponsoring agencies including the National Science Foundation, the Army Research Office, the United States Department of Agriculture, and additional state and federal agencies.

## Curriculum Listing

<http://catalog.sdsmt.edu>

### BACHELOR OF SCIENCE IN CHEMISTRY, ACS CERTIFIED

The ACS-certified curriculum provides an excellent foundation in science and mathematics for professional preparation in chemistry and meets the nationally-recognized high standards established by the American Chemical Society. This curriculum opens the way for a variety of careers in research and development in private industry or government, and gives the student an excellent foundation for graduate study in chemistry. Students desiring to meet the minimum requirements for certification by the American Chemical Society should follow the curriculum outlined below.

#### CHEMISTRY CURRICULUM/CHECKLIST

##### FRESHMAN YEAR

##### First Semester

CHEM 112	General Chemistry I	3
CHEM 112L	General Chemistry I Lab	1
ENGL 101	Composition I	3
MATH 123	Calculus I	4
Gen. Ed. Goal 3 or 4	Elective	3
IS 110	Explorations	2
CHEM 290	Seminar	0.5
<b>TOTAL</b>		<b>16.5</b>

##### Second Semester

CHEM 114	General Chemistry II	3
CHEM 114L	General Chemistry II Lab	1
MATH 125	Calculus II	4
PHYS 211	University Physics I	3
Gen. Ed. Goal 3	Elective	3
Gen. Ed. Goal 4	Elective	3
CHEM 290	Seminar	0.5
<b>TOTAL</b>		<b>17.5</b>

##### SOPHOMORE YEAR

##### First Semester

CHEM 332	Analytical Chemistry	3
CHEM 332L	Analytical Chemistry Lab	1
CHEM 326	Organic Chemistry I	3
CHEM 326L	Organic Chem. I Lab	2
MATH 321	Differential Equations	4
CHEM 252	Systematic Inorganic Chem.	3
PE	Physical Education	1
CHEM 290	Seminar	0.5
<b>TOTAL</b>		<b>17.5</b>

##### Second Semester

PHYS 213	University Physics II	3
PHYS 213L	University Physics II Lab	1
CHEM 328	Organic Chemistry II	3
CHEM 328L	Organic Chem. II Lab	2
ENGL 279	Technical Communications I	3
Humanities or Social Sciences	Elective(s) <sup>1</sup>	5
CHEM 290	Seminar	0.5
<b>TOTAL</b>		<b>17.5</b>

#### For More Information contact:

Dr. Dan Heglund  
Chair, Chemistry  
(605) 394-1241  
Dan.Heglund@sdsmt.edu



Construction is underway on the Chemical and Biological Engineering/Chemistry Building (CBE/C), a project that will enhance the educational experience for School of Mines students. The new facility will be linked to the existing Chemistry Building, adjacent to the central campus plaza. The project is scheduled to be completed in Fall 2010.

#### JUNIOR YEAR

##### First Semester

ENGL 289	Technical Communications II	3
CHEM 342	Physical Chemistry I	3
CHEM 342L	Physical Chem. I Lab	1
Elective(s)		9
PE	Physical Education	1
CHEM 490	Seminar	0.5
<b>TOTAL</b>		<b>17.5</b>

##### Second Semester

CHEM 344L	Physical Chem. II Lab	1
CHEM 344	Physical Chemistry II	3
CHEM 370	Chemical Literature	1
Advanced Chemistry Requirement <sup>2</sup>		6
CHEM 490	Seminar	0.5
Advanced Chemistry Elective <sup>3</sup>		3
<b>TOTAL</b>		<b>15.5</b>

#### SENIOR YEAR

##### First Semester

Elective(s)		8
CHEM 490	Seminar	0.5
Advanced Chemistry Requirement <sup>2</sup>		3
Advanced Chemistry Elective <sup>3</sup>		3
<b>TOTAL</b>		<b>14.5</b>

##### Second Semester

Electives		6
Advanced Chemistry Requirement <sup>2</sup>		6
CHEM 490	Seminar	0.5
<b>TOTAL</b>		<b>12.5</b>

#### 128 credits required for graduation

#### Curriculum Notes

<sup>1</sup> A minimum of 16 credit hours of university-approved humanities and social sciences are required, with a minimum of 6 hours in humanities and 6 hours in social sciences.

<sup>2</sup> Fifteen credits of advanced chemistry courses are required: Chem. 434, 434L, 452, 452L, 460 and 482.

<sup>3</sup> Three credits of advanced chemistry electives are required. Take any one of the following courses: 420, 421, 426.