

The Department of Chemistry and Applied Biological Sciences

Bachelor of Science in Applied Biological Sciences



Contact Information

Dr. Richard R. Sinden

Head, Chemistry and Applied Biological Sciences
Chemistry/Chem & Biol Engineering, Room 2206
(605) 394-1678; e-mail: Richard.Sinden@sdsmt.edu

Faculty:

Professors:

Hao Fong, Richard Sinden

Associate Professors:

David Gilley, Dan Heglund,
Mark Novak, Rajesh Sani,
Alevtina Smirnova, Zhengtao
Zhu

Assistant Professors:

Lisa Kunza

Senior Lecturers:

Lori Coble, Tsvetanka Filipova,
Justin Meyer, Yan Zhang
Cabot-Ann Christofferson,
Kelsey Gilcrease, Joseph
Marshall

Instructors:

Cabot-Ann Christofferson,
Kelsey Gilcrease, Joseph
Marshall

Emeritus:

David Boyles

Staff:

Senior Secretary:

Tara Huber

Lab Coordinator/Instrumentation Specialist:

Darren Schwede

Bachelor of Science in Applied Biological Sciences

The mission of the Bachelors of Science in Applied Biological Sciences (ABS) supports the Vision and Mission of SD MINES by providing students a solid foundation in biology with a strong focus at the molecular and cellular level combined with the relevant sciences of chemistry, math, and physics. Maintenance of a high quality curriculum with excellent classroom teaching as well as state of the art research and practical hands on experience will prepare students for career opportunities or entrance into competitive pre-professional and graduate programs. This includes careers in health care, biotechnology, environmental sciences, pharmaceutical sciences, education, law, and related disciplines.



Emphasis areas of ABS study include:

- **Pre-Medicine, Pre-Professional, or Pre-Health**
- **Molecular Genetics**
- **Cancer or Biomedical Research**
- **Biomedical Engineering**
- **Biotechnology**
- **Environmental Sciences**

Applied Biological Sciences

Biology is critical to understanding human health and the world we live in. Daily, we hear of viruses and antibiotic resistant bacteria menacing the planet. Are ecosystems at risk by the genetic modification of organisms? An Applied Biological Scientist acquires the knowledge and skills to understand and do something about these issues.

CABS Biology Faculty conduct research in many areas of biology including:

- **Cancer biology, telomere dysfunction**
- **DNA structure and genome instability**
- **Neurodegenerative disease (Friedreich Ataxia)**
- **Novel drug design and synthesis**
- **Extremophile bioprocessing & bioprospecting**
- **Aquatic ecology**
- **Leporidae (Jackrabbits) and terrestrial ecology**

Course Work – Classroom and Laboratory:

The department offers both fundamental and advanced courses in applied biology and chemistry. Most courses have an accompanying laboratory experience that teaches students the techniques and procedures needed to conduct applied biological research.

Independent Research:

Applied Biology is a *hands-on discipline* – not a spectator sport. Critical thinking and research skills are reinforced in professor-directed, one-on-one independent research experiences available to exceptional students. This experience is critical in preparing students for Graduate School. Nearly 50% of ABS graduates go to Graduate School, while more than 30% go to Medical or Professional Schools. Others enter the workplace.

Standard Curriculum

Freshman Year

Fall Semester

BIOL 111	Intro to Appl Biol Sci	1
BIOL 151	General Biology I	3
BIOL 151L	General Biology I Lab	1
CHEM 112	General Chemistry I	3
CHEM 112L	General Chemistry I Lab	1
ENGL 101	Composition I	3
MATH 123	Calculus I	4
Credit hours		16

Spring Semester

BIOL 153	General Biology II	3
BIOL 153L	General Biology II Lab	1
CHEM 114	General Chemistry II	3
CHEM 114L	General Chemistry II Lab	1
MATH 125	Calculus II	4
Elective	Humanities Elective*	3
Credit hours		15

Sophomore Year

Fall Semester

CHEM 326	Organic Chemistry I	3
CHEM 326L	Organic Chemistry I Lab	2
BIOL 331	Microbiology	3
BIOL 331L	Microbiology Lab	1
PHYS 111/211	Physics I	3
[PHYS 111L	Physics Lab	[1]
Elective	Social Science Elective*	3
Credit hours		15/16

Spring Semester

CHEM 328	Organic Chemistry II	3
CHEM 328/L	Organic Chemistry II Lab	2
BIOL 371	Genetics	3
BIOL 371L	Genetics lab	1
PHYS 113/213	Physics II	3
PHYS 213L	University Physics II Lab	1
Elective	Humanities Elective *	3
Credit hours		16

Junior Year

Fall Semester

CHEM 464	Biochemistry I	3
CHEM 464L	Biochemistry I Lab	1
BIOL 446	Molecular Cell Biology	3
BIOL 311	Principles of Ecology**	3
[or CHEM 482	Environmental Chemistry**	3]
ENGL 279	Technical Communications I	3
Credit hours		13

Spring Semester

CHEM 465	Biochemistry II	3
MATH 321/ 381	Diff Eq/Prob & Stats	3
BIOL 480	Bioinformatics	3
Elective	Social Science Elective*	3
ENGL 289	Technical Communications II	3
Credit hours		15

Senior Year

Fall Semester

BIOL 490	Seminar	1
Elective	ABS Program	3
Elective	ABS Program	3
Elective	ABS Program	3
Elective	Free Elective	3
Elective	Free Elective	3
Credit hours		16

Spring Semester

Elective	ABS Program	3 or 4
Elective	ABS Program	3
Elective	Free Elective	3
Elective	Free Elective	4
Credit hours		13/14
TOTAL CREDIT HOURS		120

Examples of ABS Program Electives for emphasis areas

Biomedical Engineering

EM 216	Statics and Dynamics	4
ME 211	Intro to Thermodynamics	3
ME 216	Intro to Solid Mechanics	3
ME 221	Dynamics of Mechanisms	3
ME 331	Thermo Fluid Mechanics	3
MET 232	Properties of Materials	3
MET 320	Metallurgical Thermodynamics	4
MATH 225	Calculus III	4
MATH 321	Differential Equations	3

Molecular Biology/Molecular Genetics/Biomed Research

BIOL 375	Current Bioethical Issues	3
BIOL 431	Industrial Microbiology	3
BIOL 423	Pathogenesis	3
BIOL 444	DNA Structure and Function	3
BIOL 470	Cancer Biology	3
BIOL 478	Microbial Genetics	3
CHEM 482	Environmental Chemistry**	3
MATH 381	Intro to Probability and Statistics	3

Pre-professional (PreMed)

BIOL 221/L	Human Anatomy	3/1
BIOL 326/L	Biomedical Physiology	3/1
BIOL 375	Current Bioethical Issues	3
BIOL 423	Pathogenesis	3
BIOL 444	DNA Structure and Function	3
BIOL 470	Cancer Biology	3
MATH 381	Intro to Probability and Statistics	3

Environmental Sciences

BIOL 311	Principles of Ecology**	3
BIOL 333	Aquatic Ecology	3
BIOL/AES 406	Global Environmental Change	3
CHEM 482	Environmental Chemistry	3
CHEM 332	Analytical Chemistry	3
GEOL 361	Oceanography	3

* Meets SD Board of Regents (BOR) Social Sciences and Humanities course requirements

** Meets SD BOR Globalization Requirement