Department of
Chemistry

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Introduction

Chemistry is the study of matter, energy and their transformations. Its principles serve as a theoretical basis for a wide variety of fields such as agriculture, biology, dentistry, engineering, geology, medicine, nutrition, and physics. In addition, its analytical and logical approach to the world is excellent training for fields such as law and government.

The Department of Chemistry offers two degrees: a Bachelor's of Science in Chemistry, and a Bachelor's of Science in Chemistry Education. In addition to the courses offered for chemistry majors, the department offers service courses to support students in technical majors to meet their requirements for graduation and to satisfy the General Education requirements in Physical Science. Introductory courses are offered on several skill levels to meet the needs of incoming students with a variety of backgrounds in math and science.

Studying chemistry at Brigham Young University–Idaho is a unique and rewarding experience. The faculty are experienced and well trained. Their commitment to students and teaching, coupled with small class sizes, provide an excellent learning environment.

Further information regarding the department programs and degrees can be obtained by visiting the department web page at http://www.byui.edu/chemistry/.

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BS in Chemistry

General Education Requirements

I. Reading and Writing:

Take 1 course:

ENG 111	3
ENG 111C	3

AND

Take 1 course:

ENG 316	3
ENG 316C	3

II. Mathematics:

Take 1 course:

MATH 112	4

III. Basic Skills:

Take 1 course:

CIT 140	3
COMM 102	3
COMM 150	3
CS 100	1
HS 131	2
HS 131W	2

OR

Take 1 course:

ESS 177	1

AND

Take 1 course:

Any 100 Level ESS Course

IV. Arts:

Take 1 course:

ART 101	3
ART 104	3
ART 160	3
ART 201	3
ART 202	3
DANCE 101	3
HFED 140	3
HORT 230	3
HUM 101	3
HUM 201	3
HUM 202	3
MUSIC 100	3
MUSIC 101	3
TA 115	3
TA 117	3

AND

Take this course:

FA 100	0-1

V. Letters:

Take 1 course:

CHIN 347	4
ENG 250	3
ENG 251	3
ENG 331	3
ENG 332	3
ENG 333	3
ENG 334	3
ENG 335	3
ENG 351	3
ENG 352	3
ENG 353	3
ENG 354	3
ENG 362	3
ENG 373	3
FR 202	3
GER 202	3
LANG 202	3
PH 314	3
PHIL 110	3
PHIL 201	3
PHIL 202	3
PHIL 313	3
PHIL 314	3
PHIL 315	3
RUSS 340	3
SPAN 202	3
SPAN 302	3

VI. Biological Science:

Take these courses:

BIO 100	3
BIO 102	1

OR

Take this course:

BIO 200	4

VII. Physical Science:

Take 4 credits:

CHEM 105	4

VIII. American Institutions:

Take 1 course:

AMHER 170	3
ECON 111	3
HIST 120	3
HIST 121	3
POLSC 110	3

IX. Social Science:

Take 1 course:

ANTH 101	3
CHILD 210	3
ECON 111	3
ECON 112	3
ED 270	3
GEOG 120	3
HIST 201	3
HIST 202	3
PHIL 203	3
PHIL 204	3
POLSC 110	3
POLSC 170	3
PSYCH 111	3
PSYCH 201	3
SOC 111	3
SOC 112	3

Religion Requirement:

(Book of Mormon)

Take these courses:

REL 121	2
REL 122	2

OR

Take this course:

REL 221	

AND

(Scripture Based Courses)

Take 6 credits:

REL 211	3
REL 212	2
REL 301	3
REL 301H	3
REL 302	3
REL 302H	3
REL 324	3

AND

(Other Religion Courses)

Take 4 credits:

REL 100	2
REL 130	2
REL 215	2
REL 234	2
REL 235	2
REL 261	2
REL 264	2
REL 333	2
REL 341	2
REL 342	3
REL 351	2
REL 352	2
REL 360	4
REL 370	2
REL 431	2
REL 471	3
REL 475	2

Total GE Credits=45

Major Requirements

Students are not allowed more than 4 hours D credit in major courses.

Take these courses:

CHEM 106	4
CHEM 220	4
CHEM 351	4
CHEM 352	4
CHEM 461	3
CHEM 462	3
CHEM 464	1
CHEM 470	3
CHEM 471	1
CHEM 481	3
CHEM 498	1-3
PH 121	3
PH 150	1
PH 220	3
PH 250	1
	39

Take these courses:

MATH 113	3
MATH 341	3
	6

OR

Take these courses:

MATH 215	4
MATH 316	4
	8

Program Notes:

Total Major Credits=45

This major also requires a minor or 2 clusters

This major is available on the following tracks:

Fall-Winter---- YES Winter-Summer---- NO Summer-Fall---- NO

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BS in Chemistry Education

General Education Requirements

I. Reading and Writing:

Take 1 course:

ENG 111	3
ENG 111C	3

AND

Take 1 course:

ENG 316	3
ENG 316C	3

II. Mathematics:

Take 1 course:

MATH 110	3
MATH 112	4

III. Basic Skills:

Take 1 course:

CIT 140	3
COMM 102	3
COMM 150	3
CS 100	1
HS 131	2
HS 131W	2

OR

Take 1 course:

ESS 177	1

AND

Take 1 course:

Any 100 Level ESS Course

IV. Arts:

Take 1 course:

ART 101	3
ART 104	3
ART 160	3
ART 201	3
ART 202	3
DANCE 101	3
HFED 140	3
HORT 230	3
HUM 101	3
HUM 201	3
HUM 202	3
MUSIC 100	3
MUSIC 101	3
TA 115	3
TA 117	3

AND

Take this course:

FA 100	0-1

V. American Institutions:

Take 1 course:

AMHER 170	3
ECON 111	3
HIST 120	3
HIST 121	3
POLSC 110	3

VI. Social Science:

Take 1 course:

ED 270	3

VII. Letters:

Take 1 course:

CHIN 347	3
ENG 250	3
ENG 251	3
ENG 331	3
ENG 332	3
ENG 333	3
ENG 334	3
ENG 335	3
ENG 351	3
ENG 352	3
ENG 353	3
ENG 354	3
ENG 362	3
ENG 373	3
FR 202	3
GER 202	3
LANG 202	3
PH 314	3
PHIL 110	3
PHIL 201	3
PHIL 202	3
PHIL 313	3
PHIL 314	3
PHIL 315	3
RUSS 340	3
SPAN 202	3
SPAN 302	3

VIII. Biological Science:

Take 4 credits:

AGRON 122	4
AGRON 270	4
BIO 100	3
BIO 102	1
BIO 118	4
BIO 120	4
BIO 130	4
BIO 150	3
BIO 150L	1
BIO 176	4
BIO 200	4
BIO 202	4
BIO 208	4
BIO 221	3
BIO 222	1
BIO 230	4
BIO 250	4
BIO 264	4
BIO 265	4
BIO 268	8

IX. Physical Science:

Take 4 credits:

CHEM 105	4

Religion Requirement:

(Book of Mormon)

Take these courses:

REL 121	2
REL 122	2

OR

Take this course:

REL 221	4

AND

(Scripture Based Courses)

Take 6 credits:

REL 211	3
REL 212	2
REL 301	3
REL 301H	3
REL 302	3
REL 302H	3
REL 324	3

AND

(Other Religion Courses)

Take 4 credits:

REL 100	2
REL 130	2
REL 215	2
REL 234	2
REL 235	2
REL 261	2
REL 264	2
REL 333	2
REL 341	2
REL 342	3
REL 351	2
REL 352	2
REL 360	4
REL 370	2
REL 431	2
REL 471	3
REL 475	2

Total GE Credits=44

Major Requirements

Students are not allowed more than 4 hours D credit in major courses.

Education Core:

Take these courses:

ED 200	2
ED 492	12
SECED 410	3
SECED 280	3
SPED 322	2
	20

Take these courses:

CHEM 106	4
CHEM 220	4
CHEM 351	4
CHEM 405	2
CHEM 461	3
CHEM 470	3
CHEM 471	1
	17

Take 1 course:

MATH 113	3
MATH 119	4
	3

Take 7 credits:

CHEM 352	4
CHEM 462	3
CHEM 464	1
CHEM 481	3
CHEM 490	1-3
	7

Program Notes:

Total Major Credits=31

Education Core Credits=22

This major also requires an education minor.

This major is available on the following tracks:

Fall-Winter---- YES Winter-Summer---- NO Summer-Fall---- NO

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Minor in Chemistry

Minor Requirements

Students are not allowed more than 4 hours "D" credit in minor courses

Take these courses:		***Take 12 credits:***		***Program Notes:***
Chem 105	4	Bio 377	3	
Chem 106	4	Chem 220	4	*Students can choose to take Bio 377 or Chem 490, but these courses cannot both count towards a chemistry minor.*
	8	Chem 351	4	
		Chem 352	4	
		Chem 461	3	
		Chem 462	3	
		Chem 464	1	
		Chem 470	3	
		Chem 471	1	
		Chem 481	3	
		Chem 490	1-3	
			12	

Total Minor Credits=20

This minor is available on the following tracks:

Fall-Winter---- YES Winter-Summer---- YES Summer-Fall---- YES

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Minor in Chemistry Education

Minor Requirements

Students are not allowed more than 4 hours "D" credit in minor courses

Take these courses:		Take 12 Credits:		***Program Notes:***
Chem 105	4	Chem 150	5	*Students can choose to take Chem 150 or Chem 351 to complete the 12 credit requirement. Students cannot count credits from Chem 150 and Chem 351 toward the minor as these courses cover similar topics.*
Chem 106	4	Chem 153	1	
	8	Chem 220	4	
		Chem 351	4	
		Chem 352	4	
		Chem 405	2	
		Chem 461	3	
		Chem 462	3	
		Chem 464	1	
		Chem 470	3	
		Chem 471	1	
		Chem 481	3	
			12	

Total Minor Credits=20

This minor is available on the following tracks:

Fall-Winter---- YES Winter-Summer---- YES Summer-Fall---- YES

Course Descriptions — Credits*

CHEM 100 Chemistry in the Modern World (4:3:2)
Fulfills GE Physical Science requirement.
Prerequisite: No previous chemistry course is required.
Competency with basic mathematical operations is assumed.
A basic course with emphasis on the applications of chemistry in areas of food, health, consumer products, natural and synthetic resources, energy, and environment. Designed for those majors requiring only a one-semester introduction to the modern applications of chemistry and those desiring a general education course in the physical sciences. This course includes a lecture and laboratory experience.
(Fall, Winter)

CHEM 101 Introductory General Chemistry (4:3:3)
Fulfills GE Physical Science requirement.
Prerequisite: Completion or concurrent enrollment in Math 108 or higher with a passing grade.
An introductory course covering basic concepts in general chemistry. The course is designed for students in home economics, nursing, agriculture, biology, and other areas that require a broad introduction to general and inorganic chemistry. It serves as a preparation for Chem 150. This course includes a lecture and laboratory experience.
(Fall, Winter, 1st and 2nd Summer Blocks)

CHEM 105 General Chemistry (4:5:2)
Fulfills GE Physical Science requirement.
Prerequisite: Students without high school chemistry or Chem 101 must have completed Math 110 or 112 or 119 with a passing grade prior to taking Chem 105. Students with high school chemistry or Chem 101 must have completed or be concurrently enrolled in Math 110 or 112 or 119.
The first semester of a year-long course designed to meet the general chemistry requirements in engineering, science, and preprofessional majors. Topics include: physical and chemical changes, scientific method, uncertainty in measurements, energy transformations, stoichiometry, classes of chemical reactions, naming compounds, thermochemistry, electrolytes and solution properties, atomic structure, bonding, VSEPR and molecular geometry, states of matter, gas laws, intermolecular forces. This course includes a lecture and laboratory experience.
(Fall, Winter, Summer)

CHEM 106 General Chemistry (4:5:2)
Fulfills GE Physical Science requirement.
Prerequisite: Completion of Chem 105 with a passing grade and Math 110 or 112 or 119 with a passing grade.
The second semester of a year-long course designed to meet the general chemistry requirements in engineering, science, and preprofessional majors. Topics include: colligative properties, chemical thermodynamics, chemical kinetics, general chemical equilibria, properties of acids and bases, acid and base equilibria, pH, buffers, ionic compound solubility and equilibria, electrochemistry, nuclear chemistry, and organic nomenclature. This course includes a lecture and laboratory experience.
(Fall, Winter, Summer)

CHEM 150 Introductory Organic and Biochemistry (5:5:0)
Prerequisite: Completion of Chem 101 or Chem 105 with a passing grade.
A second semester course in a sequence with Chem 101 designed for students in home economics, nursing, dental hygiene, and other majors that require a one-semester introduction to organic and biochemistry. Students who need an organic/biochemistry class with lab should concurrently register for Chem 153.
(Winter)

CHEM 153 Introductory Organic and Biochemistry Laboratory (1:0:3)
Prerequisite: Concurrent registration in Chem 150. This lab cannot be taken after the completion of Chem 150.
A companion laboratory course for Chemistry 150.
(Winter)

CHEM 220 Quantitative Analysis (4:2:6)
Prerequisite: Completion of Chem 106 with a passing grade.
A one-semester course that stresses quantitative analytical techniques in the laboratory, an introduction to instrumental analysis, and the chemical principles on which they are based. This course includes a lecture and laboratory experience.
(Fall)

CHEM 351 Organic Chemistry (4:5:3)
Prerequisite: Completion of Chem 106 with a D- or better.
The first semester of a year-long course that studies the principles and theories of organic chemistry including the properties, preparation, and reactions of organic compounds. The course is designed for students in Chemistry, Chemical Engineering, Premedicine, Pre-dentistry, Pre-pharmacy, Pre-veterinary and Biology. This course includes lecture and laboratory experience.
(Fall, Winter)

CHEM 352 Organic Chemistry (4:5:3)
Prerequisite: Completion of Chem 351 with a D- or better.
The second semester of a year-long course presenting the principles and theories of organic chemistry including the properties, preparation and reactions of organic compounds. The course is designed for students in Chemistry, Chemical Engineering, Premedicine, Pre-dentistry, Pre-veterinary and Biology. This course includes lecture and laboratory experience.
(Fall, Winter, Summer)

CHEM 405 Chemistry Teaching Methods (2:1:2)
Prerequisite: Completion of Secondary Education 280 and Chem 220 or Chem 351 with a passing grade.
This course will focus heavily on preparing students to be competent in laboratory procedures, including lab safety issues. Students will learn how to set up labs, order supplies, prepare and design laboratory experiments in the sciences. In addition students will become familiar with how demonstrations can be effectively used in the classroom. Ample opportunity will be given each student to practice the skills needed to effectively teach chemistry in the secondary schools. This course will also introduce the student to inquiry and process-based science curricula. Students will become familiar with and learn to apply the national and state science and chemistry standards for teaching chemistry at the secondary level.
(Fall)

CHEM 461 Physical Chemistry (3:3:0)
Prerequisite: Completion of Math 113 or Math 215 or Math 119 with a passing grade is required. Completion of Chem 351 and Phys 220 with a passing grade (C- or better) or instructor permission is required. Completion of Math 316 or Math 341 is strongly recommended.
First semester of a course covering the fundamental concepts of physical chemistry. This course provides a theoretical and mathematical description of the physical behavior of chemical systems. The first semester covers quantum mechanics and spectroscopy.
(Fall)

CHEM 462 Physical Chemistry II (3:3:0)
Prerequisite: Completion of Chem 461, Phys 220 and Math 341 or Math 316 with a passing grade (C- or better)
Second semester of a course covering the fundamental concepts of physical chemistry. This course provides a theoretical and mathematical description of the physical behavior of chemical systems. The second semester covers statistical mechanics, thermodynamics, and kinetics.
(Winter)

CHEM 464 Physical/Instrumental Chemistry Lab (1:0:3)
Prerequisite: Completion of or concurrent enrollment in Chem 462 and completion of Chem 220 with a passing grade (C- or better) is required. Completion of Phys 250 is strongly recommended.
Laboratory experience with modern instrumentation in performing physical and analytical chemistry experiments, report preparation.
(Winter)

CHEM 470 Inorganic Chemistry (3:3:0)
Prerequisite: Completion of Chem 461 with a passing grade.
A study of structure, reactivity patterns, and bond theory as applied to inorganic chemistry. Topics covered will include periodic relationships, group theory, molecular orbital and valence bond approaches to bonding, solid-state chemistry, and organometallic chemistry.
(Winter)

CHEM 471 Advanced Laboratory (1:0:3)
Prerequisite: Concurrent enrollment in Chem 470.
Laboratory exercises in the preparation and purification of inorganic compounds. Exposure to advanced synthetic techniques including vacuum lines, Schlenk manipulations, and tube furnace reactions. Characterization by modern spectroscopic techniques such as nuclear magnetic resonance, cyclic voltammetry, UV-vis, infrared, and magnetic susceptibility.
(Winter)

CHEM 481 Biochemistry (3:3:0)
Prerequisite: Completion of Bio 100 and Chem 351 with a passing grade is required. Completion of Bio 200 and Chem 352 are strongly recommended.
A one-semester course emphasizing the structure, function, and metabolism of proteins, carbohydrates, lipids, and nucleic acids. The course is designed for students in Chemistry, Biology, and those preparing to attend post-graduate and professional schools.
(Fall, Winter)

CHEM 490 Special Topics in Chemistry (1-3:1:0)
Prerequisite: Consent of instructor.
A one-semester course emphasizing current topics in chemistry. Each class participant will select a faculty supervisor who will oversee the design and implementation of a curriculum within a specific field of chemistry.
(Fall, Winter)

CHEM 498 Chemistry Internship (1-3:0:0)
Prerequisite: Completion of Chem 220, 352, 462 and 464 with a passing grade, and instructor permission.
All chemistry majors must find and experience a work internship. This would generally occur the semester after their junior year or during their senior year. The experience could involve working for a government agency, industry, an academic institution or any organization that employs laboratory chemists on their staff. The credit for the internship would count as the capstone experience required for graduation. The student will have a contract agreement with the employer and be responsible to a faculty supervisor. Upon completion of the internship, a written report and a technical presentation will be made to the BYU-Idaho chemistry department as part of the requirement.
(Fall, Winter, Summer)