Department of
Chemistry

Les Manner, Department Chair

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Introduction

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

The Department of Chemistry offers three degrees:

- A Bachelor's of Science in Chemistry.
- A Bachelor's of Science in Biochemistry.
- 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. 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/.

BS in Chemistry (710)

Take Required Foundation Courses

Major Requirements

No Grade Less Than C- in Major Courses

Introductory Chemistry Core

Take these courses:

CHEM 105	4
CHEM 106	4
CHEM 351	4
	12

Take these courses:

CHEM 220	5
CHEM 352	4
CHEM 391	2
CHEM 481	3
	14

Take these courses:

CHEM 461	3
CHEM 462	3
CHEM 464	2
CHEM 470	3
CHEM 471	2
CHEM 498	1-3
	14

Take these courses:

MATH 215	4
MATH 316	4
PH 121	3
PH 150	1
PH 220	3
PH 250	1
	16

Program Notes:

For a recommended sequence of courses, please refer to the advising information on the department website: www.byui.edu/chemistry/advising

Double Counting allowed in major and minor courses.

Double Counting NOT allowed in major and cluster courses.

Chemistry majors may need to request a track adjustment for the Fall/Winter track upon beginning their junior-level chemistry courses. Please consult with faculty advisor.

Total Major Credits=56

Additional Elective Credits Required for Graduation - 24

This major is available on the following tracks:

Fall-Winter---- YES Winter-Spring---- YES Spring-Fall---- YES

BS in Biochemistry (705)

Take Required Foundation Courses

Major Requirements

No Grade Less Than C- in Major Courses

Introductory Chemistry Core

Take these courses:

CHEM 105	4
CHEM 106	4
CHEM 351	4
	12

Take these courses:

CHEM 220	5
CHEM 352	4
CHEM 391	2
CHEM 481	3
	14

Take these courses:

BIO 180	4
BIO 321	4
CHEM 468	3
CHEM 482	3
CHEM 490	1
CHEM 498	1-3
	16

Take these courses:

MATH 113	3
PH 121	3
PH 150	1
PH 220	3
PH 250	1
	11

Biology Cluster

Take these courses:

BIO 181	4
BIO 375	3
BIO 376	3
BIO 377	3
	13

Program Notes:

For a recommended sequence of courses, please refer to the advising information on the department website: www.byui.edu/chemistry/advising

Double Counting allowed in major and minor courses.

Double Counting NOT allowed in major and cluster courses.

Chemistry majors may need to request a track adjustment for the Fall/Winter track upon beginning their junior-level chemistry courses. Please consult with faculty advisor.

Total Major Credits=66

Additional Elective Credits Required for Graduation - 14

This major is available on the following tracks:

Fall-Winter---- YES Winter-Spring---- YES Spring-Fall---- YES

BS in Chemistry Education (810)

Take Required Foundation Courses

Major Requirements

No Grade Less Than C- in Major Courses

Education Core:
Take these courses:

ED 200	2
ED 304	3
ED 361	3
ED 461	3
ED 492	10
SPED 360	2
	23

Chemistry Courses
Take these courses during your first 2 semesters:

CHEM 105	4
CHEM 106	4
PH 121	3
PH 150	1
	12

Take these courses:

CHEM 220	5
CHEM 351	4
CHEM 405	2
	11

Take 1 course:

CHEM 461	3
CHEM 468	3
	3

Physics Courses
Take this course:

PH 220	3
	3

Mathematics Courses
Take this course:

MATH 113	3
	3

Chemistry Electives
Take 7 credits:

CHEM 352	4
CHEM 462	3
CHEM 464	2
CHEM 470	3
CHEM 471	2
CHEM 481	3
	7

Physics Electives
Take 1 course:

PH 123	3
PH 250	1
PH 311	3
	1

Program Notes:
It is recommended that students minor in either Math Ed, Physics Ed, or Physical Science Ed to stay within the 120 credit limit.

Double Counting allowed in major and minor courses.

Total Major Credits=40
Education Core Credits=23

This major is available on the following tracks:

Fall-Winter---- YES Winter-Spring---- YES Spring-Fall---- YES

Biochemistry Concentration (D 112)

Concentration Requirements

No Grade Less Than C- in Concentration Courses

Introductory Chemistry Core
Take these courses:

CHEM 105	4
CHEM 106	4
CHEM 351	4
	12

Take these courses:

BIO 180	4
BIO 377	3
CHEM 220	5
CHEM 481	3
	15

Electives
Take 1 course:

BIO 321	4
CHEM 352	4
	4

Internship/Capstone
Take these courses:

IDS 398R	1-3
IDS 499	2
	3

Program Notes:

Total Concentration Credits=34

This concentration is available on the following tracks:

Fall-Winter---- YES Winter-Spring---- YES Spring-Fall---- YES

Minor in Chemistry (146)

Minor Requirements

No Grade Less Than C- in Minor Courses

Chemistry Courses
Take these courses:

CHEM 105	4
CHEM 106	4
	8

Chemistry Electives
Take 12 credits:

CHEM 220	5
CHEM 351	4
CHEM 352	4
CHEM 461 or 468	3
CHEM 462	3
CHEM 464	2
CHEM 470	3
CHEM 471	2
CHEM 481	3
CHEM 482	3
	12

Program Notes:

Total Minor Credits=20

This minor is available on the following tracks:

Fall-Winter---- YES Winter-Spring---- YES Spring-Fall---- YES

Minor in Chemistry Education (172)

Minor Requirements

No Grade Less Than C- in Minor Courses

Chemistry Courses
Take these courses:

CHEM 105	4
CHEM 106	4
	8

Chemistry Electives
Take 12 credits:

CHEM 220	5
CHEM 351	4
CHEM 352	4
CHEM 405	2
CHEM 461 or 468	3
CHEM 462	3
CHEM 464	2
CHEM 470	3
CHEM 471	2
CHEM 481	3
CHEM 482	3
	12

Program Notes:

Total Minor Credits=20

This minor is available on the following tracks:

Fall-Winter---- YES Winter-Spring---- YES Spring-Fall---- YES

Chemistry Pre-approved Cluster

Chemistry			6500
Take 12 credits:			
CHEM 105	General Chemistry	4	
CHEM 106	General Chemistry	4	
CHEM 150*	Introductory Organic and Biochemistry	5	
CHEM 220	Quantitative Analysis	5	
	Total Credits	**12**	
OR			
Take 12 credits:			
CHEM 105	General Chemistry	4	
CHEM 106	General Chemistry	4	
CHEM 220	Quantitative Analysis	5	
CHEM 351*	Organic Chemistry	4	
CHEM 352*	Organic Chemistry	4	
	Total Credits	**12**	

***Chem 150 cannot count with Chem 351 and/or Chem 352**

Animal Health Chemistry			6502
Take at least 12 credits:			
CHEM 105	General Chemistry	4	
CHEM 106	General Chemistry	4	
CHEM 351	Organic Chemistry	4	
CHEM 481	Biochemistry 1	3	
CHEM 482	Biochemistry 2	3	
	Total Credits	**12**	

Course Descriptions — Credits*

CHEM 101 Introductory General Chemistry (3:3:0)
Concurrent enrollment or completion of: FDMAT 108; FDMAT 109; FDMAT 110; FDMAT 112; MATH 109; MATH 113; or MATH 119 with a grade of C- or higher
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.
(Fall, Winter, Spring)

CHEM 101L Introductory General Chemistry Lab (1:0:3)
Concurrent enrollment or completion of: CHEM 101 with a grade of C- or higher
Chemistry 101L is an online introduction to chemistry lab that illustrates principles of chemistry and laboratory techniques. Participation in the course requires reading pre-lab materials, completion of a pre-lab quiz, watching videos demonstrating laboratory procedures, recording data and observations in electronic format, and completing a post-lab quiz.
(Fall, Winter, Spring)

CHEM 105 General Chemistry 1 (4:3:4)
Concurrent enrollment or completion of: MATH 109; FDMAT 109; FDMAT 110; FDMAT 112; MATH 113; or MATH 119 with a grade of C- or higher
The first semester of a two-semester course designed to meet the general chemistry requirements in engineering, science, and pre-professional majors. This course includes a lecture and laboratory experience.
(Fall, Winter, Spring)

CHEM 106 General Chemistry 2 (4:3:4)
Prerequisites: CHEM 105; FDMAT 109; MATH 109; FDMAT 110; FDMAT 112; MATH 113; or MATH 119 with a grade of C- or higher
The second semester of a two-semester course designed to meet the general chemistry requirements in engineering, science, and pre-professional majors. This course includes a classroom and laboratory experience.
(Fall, Winter, Spring)

CHEM 150 Introduction Organic and Biochemistry (5:5:0)
Prerequisites: CHEM 101 or CHEM 105 with a grade of C- or higher
This class is a one-semester introduction to organic and biochemistry that is a continuation of Chemistry 101 and is designed for students pursuing degrees or advanced training in nursing, dental hygiene, exercise and sports science, or health science. Students who also need an organic and biochemistry laboratory should concurrently register for Chem 153. This course is not preparatory for advanced organic and biochemistry courses.
(Winter, Spring)

CHEM 153 Introduction to Organic and Biochemistry Lab (1:0:2)
Concurrent enrollment: CHEM 150
This course is a laboratory experience that provides an introduction to basic techniques in organic chemistry and introduces the physical and chemical properties of some organic molecules. Lab cannot be taken after the completion of Chem 150.
(Winter, Spring)

CHEM 220 Quantitative Analysis (5:3:6)
Prerequisites: CHEM 106 with a grade of C- or higher
Recommended: Chem 391
A one-semester course that introduces quantitative analytical techniques, instrumental analysis, and associated chemical principles. This course includes a classroom and laboratory experience.
(Spring Fall)

CHEM 351 Organic Chemistry 1 (4:3:4)
Prerequisites: CHEM 106 with a grade of C- or higher
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, pre-medicine, pre-dentistry, pre-pharmacy, pre-veterinary and biology. This course includes a classroom and laboratory experience.
(Fall, Winter, Spring)

CHEM 352 Organic Chemistry 2 (4:3:4)
Prerequisites: CHEM 351 with a grade of C- or higher
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, pre-medicine, pre-dentistry, pre-veterinary and biology. This course includes a classroom and laboratory experience.
(Fall, Winter, Spring)

CHEM 391 Technical Writing in Chemical Literature (2:2:0)
Prerequisites: FDENG 201 and CHEM 106 with a grade of C- or higher
This course provides instruction and experience in advanced writing techniques for students planning careers in chemistry or related scientific disciplines. The course will help students:
1) Prepare for further chemistry courses that require scientific writing as a part of their curriculum;
2) Search the chemical literature using relevant database tools;
3) Develop practical experience in writing for a professional, technical audience; and
4) Become more effective written communicators in their future scientific careers.
This course is a prerequisite for: CHEM 464 and CHEM 471.
(Fall, Winter)

CHEM 405 Chemistry Teaching Methods (2:1:2)
Prerequisites: ED 361 and CHEM 352 or CHEM 461 with a grade of C- or higher
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 to each student to practice the skills needed to effectively teach chemistry in the secondary schools. 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)
Prerequisites: PH 220; MATH 215; and CHEM 351 with a grade of C- or higher.
Recommended: MATH 316 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 2 (3:3:0)
Prerequisites: PH 220; MATH 215; MATH 316; CHEM 351; and CHEM 461 with a grade of C- or higher.
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 (2:0:6)
Prerequisites: PH 250; CHEM 220; CHEM 391; and CHEM 461 with a grade of C- or higher
Concurrent enrollment or Completion of: CHEM 462 with a grade of C- or higher
Laboratory experience with modern instrumentation in performing physical and analytical chemistry experiments, practice scientific writing.
(Winter)

CHEM 468 Physical Biochemistry (3:3:0)
Prerequisites: PH 220 and CHEM 481 with a grade of C- or higher
An introduction to physical biochemistry: the application of physical laws to the chemistry to biological systems. This subject is at the intersection of physics, chemistry, and biology and serves as a capstone to the undergraduate biochemistry education.
(Winter)

CHEM 470 Inorganic Chemistry (3:3:0)
Prerequisites: CHEM 461 with a grade of C- or higher
This course involves a study of structure, physical and chemical behavior, and bond theory as applied to inorganic chemistry. Using concepts, models, and experimental data, a variety of inorganic systems will be analyzed in a systematic and detailed fashion. Underlying trends in both the elements and also their compounds will be explored and identified.
(Winter)

CHEM 471 Advanced Laboratory (2:0:6)
Concurrent enrollment or Completion of: CHEM 470 with a grade of C- or higher
This laboratory course includes exercises in the preparation and purification of inorganic compounds utilizing modern synthetic techniques and equipment. Characterization of inorganic compounds will be preformed by modern spectroscopic techniques such as nuclear magnetic resonance, UV-vis, infrared, and magnetic susceptibility.
(Winter)

CHEM 481 Biochemistry 1 (3:3:0)
Prerequisites: CHEM 351 with a grade of C- or higher
A one semester course emphasizing the structure and function of proteins, carbohydrates, lipids, and nucleic acids. The course is designed for students in chemistry, biology, and those preparing to attend graduate or professional schools.
(Fall, Winter, Spring)

CHEM 482 Biochemistry 2 (3:3:0)
Prerequisites: CHEM 481 with a grade of C- or better
An introduction to biochemistry focused on thermodynamics, equilibrium, and cellular metabolism. The course is designed for students in chemistry, biology, and those preparing to attend graduate or professional schools.
(Fall, Winter, Spring)

CHEM 490 Special Topics in Chemistry (1-3:3:0)
Repeatable Course: may earn maximum of 9 credits
Course Requirement: Instructor Authorization
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, Spring)

CHEM 498 Chemistry Internship (1-3:0:0)
Course Requirement: Instructor Authorization
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, Spring)

AP Test Credit
Exam Score 3 - Chemistry 101
Exam Score 4 - Chemistry 105
Exam Score 5 - Chemistry 105 & 106*

*If laboratory notebook is satisfactory
Please contact Chemistry Department for notebook review

* Credit Description (Credit Hours : Lecture Hours per week : Lab Hours per week)