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. 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

<table>
<thead>
<tr>
<th>Chemistry Courses</th>
<th>Take these courses during your first 2 semesters:</th>
<th>Physics</th>
<th>Take these courses:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CHEM 105: 4</td>
<td>PH 220: 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CHEM 106: 4</td>
<td>PH 250: 4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PH 121: 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PH 150: 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>12</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total Major Credits: 55

This major also requires a minor or 2 clusters

Program Notes:

- Double Counting allowed in major and minor courses.
- Double Counting not allowed in major and cluster courses.

## BS in Chemistry Education (810)

## Take Required Foundation Courses

### Major Requirements

No Grade Less Than C- in Major Courses

<table>
<thead>
<tr>
<th>Education Core</th>
<th>Take these courses:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ED 200: 2</td>
</tr>
<tr>
<td></td>
<td>ED 304: 3</td>
</tr>
<tr>
<td></td>
<td>ED 361: 3</td>
</tr>
<tr>
<td></td>
<td>ED 461: 3</td>
</tr>
<tr>
<td></td>
<td>ED 492: 10</td>
</tr>
<tr>
<td></td>
<td>SPED 360: 2</td>
</tr>
<tr>
<td></td>
<td><strong>23</strong></td>
</tr>
</tbody>
</table>

Total Major Credits: 44

Education Core Credits: 23

This major 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**

<table>
<thead>
<tr>
<th>Chemistry Courses</th>
<th>Chemistry Electives</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Take these courses:</strong></td>
<td><strong>Take 12 credits:</strong></td>
</tr>
<tr>
<td>CHEM 105 4</td>
<td>CHEM 220 5</td>
</tr>
<tr>
<td>CHEM 106 4</td>
<td>CHEM 351 4</td>
</tr>
<tr>
<td>CHEM 105 4</td>
<td>CHEM 352 4</td>
</tr>
<tr>
<td>CHEM 106 4</td>
<td>CHEM 461 3</td>
</tr>
<tr>
<td>CHEM 105 4</td>
<td>CHEM 462 3</td>
</tr>
<tr>
<td>CHEM 106 4</td>
<td>CHEM 464 2</td>
</tr>
<tr>
<td>CHEM 105 4</td>
<td>CHEM 470 3</td>
</tr>
<tr>
<td>CHEM 106 4</td>
<td>CHEM 471 2</td>
</tr>
<tr>
<td>CHEM 105 4</td>
<td>CHEM 481 4</td>
</tr>
</tbody>
</table>

**Total Minor Credits=20**

This minor is available on the following tracks:

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

### Chemistry Courses

**Take these courses:**

- CHEM 105: 4 credits
- CHEM 106: 4 credits

### Chemistry Electives

**Take 12 credits:**

- CHEM 220: 5 credits
- CHEM 351: 4 credits
- CHEM 352: 4 credits
- CHEM 461: 3 credits
- CHEM 462: 3 credits
- CHEM 464: 2 credits
- CHEM 470: 3 credits
- CHEM 471: 2 credits
- CHEM 481: 4 credits

**Total Credits: 12**

## Minor in Chemistry Education (172)

### Minor Requirements

**No Grade Less Than C- in Minor Courses**

<table>
<thead>
<tr>
<th>Chemistry Courses</th>
<th>Chemistry Electives</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Take these courses:</strong></td>
<td><strong>Take 12 credits:</strong></td>
</tr>
<tr>
<td>CHEM 105 4</td>
<td>CHEM 220 5</td>
</tr>
<tr>
<td>CHEM 106 4</td>
<td>CHEM 351 4</td>
</tr>
<tr>
<td>CHEM 105 4</td>
<td>CHEM 352 4</td>
</tr>
<tr>
<td>CHEM 106 4</td>
<td>CHEM 405 2</td>
</tr>
<tr>
<td>CHEM 105 4</td>
<td>CHEM 461 3</td>
</tr>
<tr>
<td>CHEM 106 4</td>
<td>CHEM 462 3</td>
</tr>
<tr>
<td>CHEM 105 4</td>
<td>CHEM 464 2</td>
</tr>
<tr>
<td>CHEM 106 4</td>
<td>CHEM 470 3</td>
</tr>
<tr>
<td>CHEM 105 4</td>
<td>CHEM 471 2</td>
</tr>
<tr>
<td>CHEM 106 4</td>
<td>CHEM 481 4</td>
</tr>
</tbody>
</table>

**Total Minor Credits=20**

This minor is available on the following tracks:

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

### Chemistry Courses

**Take these courses:**

- CHEM 105: 4 credits
- CHEM 106: 4 credits

### Chemistry Electives

**Take 12 credits:**

- CHEM 220: 5 credits
- CHEM 351: 4 credits
- CHEM 352: 4 credits
- CHEM 405: 2 credits
- CHEM 461: 3 credits
- CHEM 462: 3 credits
- CHEM 464: 2 credits
- CHEM 470: 3 credits
- CHEM 471: 2 credits
- CHEM 481: 4 credits

**Total Credits: 12**

### Chemistry Introductory Module

| 6500 |
|--------------------------|----------------|
| **Take 12 credits:** | **Total Credits:** |
| CHEM 105: General Chemistry | 4 |
| CHEM 106: General Chemistry | 4 |
| CHEM 121: General Chemistry | 3 |
| PH 150: Beginning Physics Lab | 1 |

**Total Credits: 12**

### Animal Health Chemistry

| 1013 |
|--------------------------|----------------|
| **Take 12 credits:** | **Total Credits:** |
| CHEM 105: General Chemistry | 4 |
| CHEM 106: General Chemistry | 4 |
| CHEM 351: Organic Chemistry | 4 |
| CHEM 481: Biochemistry | 4 |

**Total Credits: 12**
Course Descriptions

CHEM 101 Introductory General Chemistry
Prerequisites: Completion of or concurrent enrollment in FDMAT 108, Math 109, FDMAT 110, FDMAT 112, Math 113 or Math 119 with a grade of C- or better.
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, Spring)

CHEM 105 General Chemistry 1
Prerequisites: Completion of or concurrent enrollment in Math 109, FDMAT 110, FDMAT 112, Math 113 or Math 119 with a grade of C- or better.
The first semester of a year-long 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
Prerequisites: Completion of Chem 105 and (Math 109, FDMAT 110, FDMAT 112, Math 113 or Math 119) with a grade of C- or better.
The second semester of a year-long 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 150 Introductory Organic and Biochemistry
Prerequisites: Completion of Chem 101 or Chem 105 with a grade of C- or better.
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.
(Once a year, alternating Winter and Spring semesters)

CHEM 153 Introductory Organic and Biochemistry Lab
Prerequisites: Concurrent registration in Chem 150. This lab cannot be taken after the completion of Chem 150.
Class focuses on organic chemistry techniques and reactions of biochemically important groups.
(Once a year, alternating Winter and Spring semesters)

CHEM 220 Quantitative Analysis
Prerequisites: Completion of Chem 106 with a grade of C- or better.
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, Spring)

CHEM 351 Organic Chemistry 1
Prerequisites: Completion of Chem 106 with a grade of C- 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, Pre-medicine, Pre-dentistry, Pre-pharmacy, Pre-veterinary and Biology. This course includes a lecture and laboratory experience.
(Fall, Winter, Spring)

CHEM 352 Organic Chemistry 2
Prerequisites: Completion of Chem 351 with a grade of C- 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, Pre-medicine, Pre-dentistry, Pre-veterinary and Biology. This course includes a lecture and laboratory experience.
(Fall, Winter, Spring)

CHEM 391 Writing in Chemistry
Prerequisites: Completion of Chem 106 and FDMENG 201 with a grade of C- or better, or instructors approval.
Instruction and experience in advanced writing techniques for students who plan to enter careers in chemistry or related scientific disciplines.
(Once a year, alternating Fall and Winter semesters)

CHEM 405 Chemistry Teaching Methods
Prerequisites: Completion of Ed 361 and (Chem 352 or Chem 461) with a grade of C- or better.
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 Ph ysical Chemistry
Prerequisites: Completion of (Math 113, Math 215, or Math 119) and Chem 351 and Phys 220 with a grade of C- or better. 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, Spring)

CHEM 462 Physical Chemistry 2
Prerequisites: Completion of (Math 113 or Math 215) and Chem 351 and Phys 220 with a grade of C- or better. Completion of Math 316 or Math 341 is strongly recommended.
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
Prerequisites: Completion of Phys 250, Chem 220, Chem 391, Chem 461, and completion of or concurrent enrollment in Chem 402, all with grades of C- or better.
Laboratory experience with modern instrumentation in performing physical and analytical chemistry experiments, scientific writing.
(Winter)

CHEM 470 Inorganic Chemistry
Prerequisites: Completion of Chem 461 with a grade of C- or better.
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
Prerequisites: 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
Prerequisites: Completion of Chem 351 with a grade of C- or better.
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 graduate or professional schools.
(Fall, Winter, Spring)

CHEM 490 Special Topics in Chemistry
Prerequisites: Instructor consent.
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

Prerequisites: Completion of Chem 220, Chem 352, Chem 462 and Chem 464 with a C- or higher and consent of instructor.

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)

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