# University Core and Graduation Requirements

## University Core Requirements:

### Religion Cornerstones

- **Teachings and Doctrine of The Book of Mormon**
  - Classes: 1
  - Hours: 2.0
  - Class: REL A 275

- **Jesus Christ and the Everlasting Gospel**
  - Classes: 1
  - Hours: 2.0
  - Class: REL A 250

- **Foundations of the Restoration**
  - Classes: 1
  - Hours: 2.0
  - Class: REL C 225

- **The Eternal Family**
  - Classes: 1
  - Hours: 2.0
  - Class: REL C 200

### The Individual and Society

- **American Heritage**
  - Classes: 1-2
  - Hours: 3-6.0
  - From approved list

- **Global and Cultural Awareness**
  - Classes: 1
  - Hours: 3.0
  - From approved list

### Skills

- **First Year Writing**
  - Classes: 1
  - Hours: 3.0
  - From approved list

- **Advanced Written and Oral Communications**
  - Classes: 1
  - Hours: 3.0
  - CHEM 391*

- **Quantitative Reasoning**
  - Classes: 1
  - Hours: 4.0
  - MATH 112* or 113*

- **Languages of Learning (Math or Language)**
  - Classes: 1
  - Hours: 4.0
  - MATH 112* or 113*

### Arts, Letters, and Sciences

- **Civilization 1**
  - Classes: 1
  - Hours: 3.0
  - From approved list

- **Civilization 2**
  - Classes: 1
  - Hours: 3.0
  - From approved list

- **Arts**
  - Classes: 1
  - Hours: 3.0
  - From approved list

- **Letters**
  - Classes: 1
  - Hours: 3.0
  - From approved list

- **Biological Science**
  - Classes: 1
  - Hours: 3.0 / 4.0
  - CHEM 481M* or BIO 130*

- **Physical Science**
  - Classes: 2
  - Hours: 7.0
  - CHEM 111* and PHSCS 121*

- **Social Science**
  - Classes: 1
  - Hours: 3.0
  - From approved list

### Core Enrichment: Electives

- **Religion Electives**
  - Classes: 3-4
  - Hours: 6.0
  - From approved list

## Graduation Requirements:

- **Minimum residence hours required**
  - Hours: 30.0

- **Minimum hours needed to graduate**
  - Hours: 120.0

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### Suggested Sequence of Courses

#### FRESHMAN YEAR

- **1st Semester**
  - Class: Open Electives
  - Hours: 2.0
  - CHEM 111* (F)
  - Hours: 4.0
  - CHEM 481M* (F)

- **2nd Semester**
  - Class: First-year Writing or A HTG 100
  - Hours: 3.0
  - CHEM 112* (W)
  - Hours: 3.0
  - CHEM 113* (FW)

#### SOPHOMORE YEAR

- **3rd Semester**
  - Class: CHEM 227 (FSp)
  - Hours: 4.0
  - CHEM 351M* (F)
  - Hours: 3.0
  - Religion Cornerstone course

- **4th Semester**
  - Class: CHEM 352M* (W)
  - Hours: 3.0
  - CHEM 354* (FWSp)
  - Hours: 2.0
  - Religion Cornerstone course

#### JUNIOR YEAR

- **5th Semester**
  - Class: CHEM 353M* (W)
  - Hours: 3.0
  - CHEM 482 (W)
  - Hours: 3.0
  - CHEM 489 (F)

- **6th Semester**
  - Class: CHEM 498R or open electives
  - Hours: 1.0
  - PD BIO 360 (FWSp) or other Requirement 3
  - Hours: 3.0
  - CHEM 495 (FW)

#### SENIOR YEAR

- **7th Semester**
  - Class: CHEM 482 (W)
  - Hours: 3.0
  - CHEM 584 (F)
  - Hours: 3.0
  - CHEM 594R (FW)

- **8th Semester**
  - Class: CHEM 498R or other Requirement 4
  - Hours: 1.0
  - Arts
  - Hours: 3.0
  - Letters
  - Hours: 3.0
  - Religion Elective
  - Hours: 2.0

#### Note:

- CHEM 498R is a research capstone class. Typically, enrollment in CHEM 498R follows enrollment in CHEM 497R. Both courses give students an opportunity to be mentored in a faculty’s research lab and receive class credit. Permission from faculty to enroll in either course is required. Contact department office for specific details.
No more than 3 hours of D credit is allowed in major courses.

**REQUIREMENT 1** Complete 17 courses.

**NOTE: WITH DEPARTMENTAL APPROVAL, CHEM 105 MAY SUBSTITUTE FOR CHEM 111, AND CHEM 106 FOR CHEM 112, AND CHEM 107 FOR CHEM 113. MATH 314 MAY SUBSTITUTE FOR CHEM 460.**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>CHEM 111</td>
<td>Principles of Chemistry 1</td>
<td>4.0</td>
</tr>
<tr>
<td>CHEM 112</td>
<td>Principles of Chemistry 2</td>
<td>3.0</td>
</tr>
<tr>
<td>CHEM 113</td>
<td>Introductory General Chemistry Laboratory</td>
<td>2.0</td>
</tr>
<tr>
<td>CHEM 201</td>
<td>Chemical Handling and Safe Laboratory Practices</td>
<td>0.5</td>
</tr>
<tr>
<td>CHEM 227</td>
<td>Principles of Chemical Analysis</td>
<td>4.0</td>
</tr>
<tr>
<td>CHEM 351H</td>
<td>Organic Chemistry 1 - Majors</td>
<td>3.0</td>
</tr>
<tr>
<td>CHEM 352H</td>
<td>Organic Chemistry 2 - Majors</td>
<td>3.0</td>
</tr>
<tr>
<td>CHEM 354</td>
<td>Organic Chemistry Laboratory--Majors</td>
<td>2.0</td>
</tr>
<tr>
<td>CHEM 391</td>
<td>Technical Writing Using Chemical Literature</td>
<td>3.0</td>
</tr>
<tr>
<td>CHEM 468</td>
<td>Biophysical Chemistry</td>
<td>3.0</td>
</tr>
<tr>
<td>CHEM 481H</td>
<td>Biochemistry--Majors</td>
<td>3.0</td>
</tr>
<tr>
<td>CHEM 482</td>
<td>Mechanisms of Molecular Biology</td>
<td>3.0</td>
</tr>
<tr>
<td>CHEM 489</td>
<td>Structural Biochemistry</td>
<td>3.0</td>
</tr>
<tr>
<td>CHEM 495</td>
<td>Senior Seminar</td>
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<tr>
<td>CHEM 584</td>
<td>Advanced Biochemistry Methods 1</td>
<td>3.0</td>
</tr>
<tr>
<td>CHEM 586</td>
<td>Advanced Biochemistry Methods 2</td>
<td>3.0</td>
</tr>
<tr>
<td>CHEM 594H</td>
<td>General Seminar</td>
<td>0.5</td>
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**REQUIREMENT 2** Complete 8 courses.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>BIO 130</td>
<td>Biology</td>
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</tr>
<tr>
<td>MATH 112</td>
<td>Calculus 1</td>
<td>4.0</td>
</tr>
<tr>
<td>MATH 113</td>
<td>Calculus 2</td>
<td>4.0</td>
</tr>
<tr>
<td>PHYS 121</td>
<td>Introduction to Newtonian Mechanics</td>
<td>3.0</td>
</tr>
<tr>
<td>PHYS 123</td>
<td>Introduction to Waves, Optics, and Thermodynamics</td>
<td>3.0</td>
</tr>
<tr>
<td>PHYS 220</td>
<td>Introduction to Electricity and Magnetism</td>
<td>3.0</td>
</tr>
<tr>
<td>PWS 340</td>
<td>Genetics</td>
<td>3.0</td>
</tr>
<tr>
<td>STAT 201</td>
<td>Statistics for Engineers and Scientists</td>
<td>3.0</td>
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**REQUIREMENT 3** Complete 1 course

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>MMBIO 461</td>
<td>Immunology</td>
<td>3.0</td>
</tr>
<tr>
<td>MMBIO 460</td>
<td>Virology</td>
<td>3.0</td>
</tr>
<tr>
<td>MMBIO 468</td>
<td>(MMBio Bio-PWS) Genomics</td>
<td>3.0</td>
</tr>
<tr>
<td>PDBIO 360</td>
<td>Cell Biology</td>
<td>3.0</td>
</tr>
<tr>
<td>PDBIO 362</td>
<td>Advanced Physiology</td>
<td>3.0</td>
</tr>
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**REQUIREMENT 4** Complete 3.0 hours from the following course(s).

**AFTER CONSULTING WITH AN ADVISOR, COMPLETE 3 HOURS FROM THE FOLLOWING. NOTE: WITH PRIOR APPROVAL, MANY 300-LEVEL AND ABOVE COURSES IN BIOLOGY, INTEGRATIVE BIOLOGY, MICROBIOLOGY AND MOLECULAR BIOLOGY, AND PHYSIOLOGY AND DEVELOPMENTAL BIOLOGY WILL FILL THIS REQUIREMENT.**

<table>
<thead>
<tr>
<th>Course Code</th>
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<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>CHEM 397R</td>
<td>Mentored Outreach and Service Learning</td>
<td>3.0v</td>
</tr>
<tr>
<td>CHEM 455</td>
<td>Synthesis and Qualitative Organic Analysis</td>
<td>4.0v</td>
</tr>
<tr>
<td>CHEM 460</td>
<td>Mathematics for Physical Chemistry</td>
<td>1.0v</td>
</tr>
<tr>
<td>CHEM 496R</td>
<td>Academic Internship: Chemistry and Biochemistry</td>
<td>6.0v</td>
</tr>
<tr>
<td>CHEM 498R</td>
<td>Capstone Experience in Chemistry/Biochemistry</td>
<td>4.0v</td>
</tr>
<tr>
<td>CHEM 514</td>
<td>Inorganic Chemistry</td>
<td>3.0</td>
</tr>
<tr>
<td>CHEM 518</td>
<td>Advanced Inorganic Laboratory</td>
<td>2.0</td>
</tr>
<tr>
<td>CHEM 521</td>
<td>Instrumental Analysis Lecture</td>
<td>2.0</td>
</tr>
<tr>
<td>CHEM 523</td>
<td>Instrumental Analysis Laboratory</td>
<td>2.0</td>
</tr>
<tr>
<td>CHEM 552</td>
<td>Advanced Organic Chemistry</td>
<td>3.0</td>
</tr>
<tr>
<td>CHEM 553</td>
<td>Advanced Organic Chemistry</td>
<td>3.0</td>
</tr>
<tr>
<td>CHEM 563</td>
<td>Reaction Kinetics</td>
<td>3.0</td>
</tr>
<tr>
<td>CHEM 565</td>
<td>Introduction to Quantum Chemistry</td>
<td>3.0</td>
</tr>
<tr>
<td>CHEM 567</td>
<td>Statistical Mechanics</td>
<td>3.0</td>
</tr>
<tr>
<td>CHEM 569</td>
<td>Fundamentals of Spectroscopy</td>
<td>3.0</td>
</tr>
<tr>
<td>CHEM 581</td>
<td>Advanced Biochemical Methodology 1</td>
<td>3.0</td>
</tr>
<tr>
<td>CHEM 583</td>
<td>Advanced Biochemical Methodology 2</td>
<td>3.0</td>
</tr>
<tr>
<td>CHEM 596R</td>
<td>Special Topics in Chemistry</td>
<td>3.0v</td>
</tr>
<tr>
<td>HONRS 499R</td>
<td>Honors Thesis</td>
<td>6.0v</td>
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**Recommended Course:** Chem 460.

**Note:** Supporting courses suggested by most medical and dental schools are found by visiting the Preprofessional Advisement Office. The more rigorous chemistry, mathematics, and physics courses required for the chemistry majors will satisfy the minimum requirements listed here. Elective courses in biochemistry and in biological science are especially pertinent to these preprofessional programs.

### REGISTRATION ADVISEMENT

We want to assist students in their academic pursuit toward an undergraduate degree. Students are encouraged to complete an average of 15 credit hours each semester or 30 credit hours each year, which could include spring and/or summer terms. Taking fewer credits substantially increases the number of semesters to graduate.

New students should attend the chemistry and biochemistry session during New Student Orientation, where they can meet with a faculty advisor and review their planned registration.

Transfer students must complete the following 1 course:

<table>
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<th>Course Title</th>
<th>Hours</th>
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</table>

mid-year incoming students should meet with an advisor prior to the add/drop deadline of their first semester, usually after the first week of class.

The department recommends a review of progress and planned registration with a faculty advisor in the semester when 30, 60, and 90 hours are completed. However, academic advisement is available to all majors at any point in their academic career. Contact the department advisement office to schedule an appointment with a faculty advisor: in person C104 BNSN; by phone 801-422-6269; by email suemort@chem.byu.edu or coffice@chem.byu.edu

### THE DISCIPLINE

The Biochemistry Bachelor of Science degree provides excellent preparation for students preparing for health-related fields (medicine, dentistry, veterinary medicine) or for those who desire an advanced degree (MS or PhD) in biochemistry, molecular biology, or the health sciences. Chemists and biochemists study the fundamental processes that govern the natural world, including atomic structure and how atoms interact to form molecules and materials. They study the mechanisms of chemical processes, including those that underpin living systems such as the transfer of information from DNA to RNA to proteins. They work to develop simplifying models (theories) that permit the correlation and explanation of observations about the behavior of life to the structure of rocks and minerals.

Chemistry and biochemistry provide an essential foundation for the medical sciences, engineering (especially chemical engineering), electronics, energy, environmental sciences, materials science, pharmacy, and virtually all manufacturing processes.

Chemistry and biochemistry are active branches of science that are vital to human existence. Inasmuch as the field embraces all aspects of the material world, it is subdivided into five areas of interest. Examples of these diverse areas include the regulation of protein synthesis, cellular signal transduction at the molecular...
level and proteomics (biochemistry), design and synthesis of medicinal compounds, catalysts and polymers (organic chemistry), design and synthesis of new molecular structures and materials (inorganic chemistry), spectroscopic study of energy transfer and molecular structures (physical chemistry), and analysis of medicinal compounds, biological materials, and contaminants or trace elements found in the environment (analytical chemistry).

Chemistry and biochemistry involve far more than test tubes and beakers. They include sophisticated methodologies such as recombinant DNA technology, working with a variety of instruments such as mass spectrometers, calorimeters, chromatographs, ultracentrifuges, lasers, X-ray diffractometers, electron microscopes and nuclear magnetic resonance spectrometers, all of which are used by undergraduate chemistry and biochemistry students at BYU. Computers also play an important role in these disciplines, with applications ranging from simulation of molecules and their interactions to the collection and analysis of data. The chemistry and biochemistry curricula are both rigorous and intellectually rewarding.

**CAREER OPPORTUNITIES**

Graduates in chemistry and biochemistry obtain positions in education and many different industries, performing analysis, synthesis, characterization, observation, and modeling. Those who work hard, are creative, and have intellectual curiosity are in particular demand. The discipline also provides an excellent preprofessional course of study for those interested in medicine, dentistry, law, and business.

**MAP DISCLAIMER**

While every reasonable effort is made to ensure accuracy, there are some student populations that could have exceptions to listed requirements. Please refer to the university catalog and your college advisement center/department for complete guidelines.

**DEPARTMENT INFORMATION**

Department of Chemistry and Biochemistry Advisement

<table>
<thead>
<tr>
<th>BS in Biochemistry (692826)</th>
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<tbody>
<tr>
<td>Brigham Young University</td>
</tr>
<tr>
<td>C-104 BHSN</td>
</tr>
<tr>
<td>Provo, UT 84602</td>
</tr>
<tr>
<td>Telephone: (801) 422-6269</td>
</tr>
</tbody>
</table>

**ADVISEMENT CENTER INFORMATION**

Physical and Mathematical Sciences College Advisement Center

Brigham Young University

N-181 ESC

Provo, UT 84602

Telephone: (801) 422-2674