# BS in Chemistry (692821) MAP Sheet

Physical and Mathematical Sciences, Chemistry and Biochemistry

For students entering the degree program during the 2021-2022 curricular year.

## University Core and Graduation Requirements

<table>
<thead>
<tr>
<th>Requirements</th>
<th>#Classes</th>
<th>Hours</th>
<th>Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Religion Cornerstones</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teachings and Doctrine of The Book of Mormon</td>
<td>1</td>
<td>2.0</td>
<td>REL A 275</td>
</tr>
<tr>
<td>Jesus Christ and the Everlasting Gospel</td>
<td>1</td>
<td>2.0</td>
<td>REL A 250</td>
</tr>
<tr>
<td>The Eternal Family</td>
<td>1</td>
<td>2.0</td>
<td>REL C 225</td>
</tr>
<tr>
<td><strong>The Individual and Society</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>American Heritage</td>
<td>1-2</td>
<td>3-6.0</td>
<td>from approved list</td>
</tr>
<tr>
<td>Global and Cultural Awareness</td>
<td>1</td>
<td>3.0</td>
<td>from approved list</td>
</tr>
<tr>
<td><strong>Skills</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First Year Writing</td>
<td>1</td>
<td>3.0</td>
<td>from approved list</td>
</tr>
<tr>
<td>Advanced Written and Oral Communications</td>
<td>1</td>
<td>3.0</td>
<td>CHEM 391*</td>
</tr>
<tr>
<td>Quantitative Reasoning</td>
<td>1</td>
<td>4.0</td>
<td>MATH 112* or 113*</td>
</tr>
<tr>
<td>Languages of Learning (Math or Language)</td>
<td>1</td>
<td>4.0</td>
<td>MATH 112* or 113*</td>
</tr>
<tr>
<td><strong>Arts, Letters, and Sciences</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Civilization 1</td>
<td>1</td>
<td>3.0</td>
<td>from approved list</td>
</tr>
<tr>
<td>Civilization 2</td>
<td>1</td>
<td>3.0</td>
<td>from approved list</td>
</tr>
<tr>
<td>Arts</td>
<td>1</td>
<td>3.0</td>
<td>from approved list</td>
</tr>
<tr>
<td>Letters</td>
<td>1</td>
<td>3.0</td>
<td>from approved list</td>
</tr>
<tr>
<td>Biological Science</td>
<td>1</td>
<td>3.0/4.0</td>
<td>CELL 120 or BIO 130</td>
</tr>
<tr>
<td>Physical Science</td>
<td>2</td>
<td>7.0</td>
<td>CHEM 111* and PHSCS 121*</td>
</tr>
<tr>
<td>Social Science</td>
<td>1</td>
<td>3.0</td>
<td>from approved list</td>
</tr>
<tr>
<td><strong>Core Electives: Electives</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Religion Electives</td>
<td>3-4</td>
<td>6.0</td>
<td>from approved list</td>
</tr>
<tr>
<td>Open Electives</td>
<td>Variable</td>
<td>Variable</td>
<td>personal choice</td>
</tr>
</tbody>
</table>

*These classes fill both University Core and Program Requirements (18 hours overlap)

## Graduation Requirements:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum residence hours required</td>
<td>30.0</td>
</tr>
<tr>
<td>Minimum hours needed to graduate</td>
<td>120.0</td>
</tr>
</tbody>
</table>

## Suggested Sequence of Courses

### FRESHMAN YEAR

#### 1st Semester
- AHTG 100 (FWSpSu) or First-year Writing: 3.0
- CHEM 111* (F): 4.0
- CELL 120, BIO 130 or other elective: 3.0-4.0
- MATH 112* (FWSpSu): 4.0
- Religion Cornerstone course: 2.0
- **Total Hours**: 16.0-17.0
*With department approval, CHEM 105 may be substituted for CHEM 111.*

#### 2nd Semester
- AHTG 100 (FWSpSu) or First-year Writing: 3.0
- CHEM 112* (FW): 3.0
- CHEM 113* (FW): 2.0
- CHEM 201 (FW): 0.5
- MATH 113 (FWSpSu): 4.0
- Religion Cornerstone course: 2.0
- **Total Hours**: 14.5
*With department approval, CHEM 106 may be substituted for CHEM 112; CHEM 107 for CHEM 113.*

### SOPHOMORE YEAR

#### 2nd Semester
- CHEM 227 (FWSp): 4.0
- CHEM 351M* (F): 3.0
- MATH 213 (FWSpSu): 2.0
- MATH 215 (FWSpSu): 1.0
- PHSCS 121 (FWSp): 3.0
- Religion Cornerstone course: 2.0
- **Total Hours**: 15.0

#### 3rd Semester
- CHEM 351 (FW): 3.0
- CHEM 352* (FWSp): 2.0
- CHEM 381M* (W): 2.0
- CHEM 391 (FW): 3.0
- Religion Cornerstone course: 1.0
- **Total Hours**: 15.0
*CHEM 351 may be substituted for CHEM 351M.*

### JUNIOR YEAR

#### 4th Semester
- CHEM 352M* (W): 3.0
- CHEM 354* (FWSp): 2.0
- CHEM 383M* (W): 3.0
- PHSCS 123 (FWSp): 3.0
- CHEM 457R: 1.0
- Religion Cornerstone course: 2.0
- Open elective: 1.0
- **Total Hours**: 15.0

#### 5th Semester
- CHEM 352 may substitute for CHEM 352M; CHEM 353 for CHEM 354.
- **With department approval, CHEM 481 may substitute for CHEM 381M.*

#### 6th Semester
- CHEM 455* (F) or Req. 4: 3.0
- CHEM 460 (F): 1.0
- CHEM 462 (F): 3.0
- PHSCS 220 (FWSp): 3.0
- Religion Elective: 2.0
- **Total Hours**: 16.0
*Only CHEM 455 or CHEM 521 and 523 (taken in the senior year) is required (see Requirement #3, options 3.1, 3.2). It is encouraged to take both options to fulfill Req. #3 and #4.*

#### 7th Semester
- CHEM 351 (FW): 3.0
- CHEM 460 (F): 1.0
- CHEM 462 (F): 1.0
- CHEM 497R or Requirement 4: 1.0
- Global and Cultural Awareness: 3.0
- Religion Elective: 2.0
- Open Elective: 1.0
- **Total Hours**: 15.0

#### 8th Semester
- CHEM 351* (FW): 3.0
- CHEM 479R, 489R or Requirement 4: 1.0
- Religion Elective: 2.0
- **Total Hours**: 14.5
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 (see Requirement #3, options 3.1, 3.2). It is encouraged to take both options to fulfill Req. #3 and #4.

## SENIOR YEAR

#### 9th Semester
- CHEM 455* (F) or Req. 4: 2.0
- CHEM 514* (F): 3.0
- CHEM 548* (FW): 0.5
- Social Science: 3.0
- Arts or Letters: 3.0
- CHEM 497R, 498R or Requirement 4: 1.0
- Religion Elective: 2.0
- **Total Hours**: 14.5

#### 10th Semester
- CHEM 460 (F): 1.0
- CHEM 514* (F): 3.0
- CHEM 548* (FW): 0.5
- Social Science: 3.0
- Arts or Letters: 3.0
- CHEM 497R, 498R or Requirement 4: 1.0
- Religion Elective: 2.0
- **Total Hours**: 14.5
### REQUIREMENT 1
No more than 3 hours of D credit is allowed in major courses.

### REQUIREMENT 2
COMPLETE ONE OF THE FOLLOWING ADVANCED OPTIONS:
- CHEM 354
- CHEM 351M - Organic Chemistry 1 - Majors
- MATH 215
- MATH 213
- MATH 113
- MATH 112
- CHEM 594R - General Seminar
- CHEM 518
- CHEM 514
- CHEM 495
- CHEM 465
- CHEM 464
- CHEM 463
- CHEM 462
- CHEM 460
- *CHEM 391
- CHEM 381M - Fundamentals of Biochemistry
- CHEM 354
- CHEM 351M - Organic Chemistry 1 - Majors
- MATH 227
- MATH 215
- MATH 213
- MATH 113
- MATH 112
- CHEM 594R - General Seminar
- CHEM 518
- CHEM 514
- CHEM 495
- CHEM 465
- CHEM 464
- CHEM 463
- CHEM 462
- CHEM 460
- *CHEM 391
- CHEM 381M - Fundamentals of Biochemistry
- CHEM 227
- CHEM 113
- CHEM 112

You may take this course up to 1 time.

### REQUIREMENT 3
Complete 7 courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 112 - Calculus 1</td>
<td>4.0</td>
</tr>
<tr>
<td>MATH 113 - Calculus 2</td>
<td>4.0</td>
</tr>
<tr>
<td>MATH 213 - Elementary Linear Algebra</td>
<td>2.0</td>
</tr>
<tr>
<td>MATH 215 - Computational Linear Algebra</td>
<td>1.0</td>
</tr>
<tr>
<td>PHYSCS 121 - Introduction to Newtonian Mechanics</td>
<td>3.0</td>
</tr>
<tr>
<td>PHYSCS 123 - Introduction to Waves, Optics, and Thermodynamics</td>
<td>3.0</td>
</tr>
<tr>
<td>PHYSCS 220 - Introduction to Electricity and Magnetism</td>
<td>3.0</td>
</tr>
</tbody>
</table>

### REQUIREMENT 4
Complete 9.0 hours from the following course(s)

### 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 or mid-year incoming students should meet with an advisor prior to the add/drop deadline of their first semester, which usually follows 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

### THE DISCIPLINE
The Chemistry Bachelor of Science degree is the preferred degree for chemistry majors (approved by the American Chemical Society), especially those who desire an advanced degree (MS or PhD) in chemistry. It also provides excellent preparation for individuals in preprofessional programs (e.g., medicine, dentistry, business administration, or law).

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.