BS in Chemistry Education (692828) MAP Sheet
Physical and Mathematical Sciences, Chemistry and Biochemistry

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

This major is designed to prepare students to teach in public schools. In order to graduate with this major, students are required to complete Utah State Office of Education licensing requirements. To view these requirements go to

http://education.byu.edu/ess/licensing.html or contact Education Advisement Center, 350 MCKB, 801-422-3426.

### Graduation Requirements:

- Minimum residence hours required: 30.0
- Minimum hours needed to graduate: 120.0

### Suggested Sequence of Courses

**FRESHMAN YEAR**

<table>
<thead>
<tr>
<th>Semester</th>
<th>Class Code</th>
<th>Hours</th>
<th>Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Semester</td>
<td>CHEM 111* (F)</td>
<td>4.0</td>
<td>REL A 275</td>
</tr>
<tr>
<td>1st Semester</td>
<td>First-year Writing or A HTG 100 (FWSpSu)</td>
<td>3.0</td>
<td>REL A 250</td>
</tr>
<tr>
<td>1st Semester</td>
<td>MATH 112 (FWSpSu)</td>
<td>4.0</td>
<td>REL C 225</td>
</tr>
<tr>
<td>1st Semester</td>
<td>PWS 150* (FW) or other Requirement #5</td>
<td>3.0</td>
<td>REL C 200</td>
</tr>
</tbody>
</table>

**Total Hours**

| 1st Semester | 15.0 | 2nd Semester | 15.5 |

*CHEM 105 may substitute for CHEM 101.

**JUNIOR YEAR**

<table>
<thead>
<tr>
<th>Semester</th>
<th>Class Code</th>
<th>Hours</th>
<th>Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td>3rd Semester</td>
<td>CHEM 227 (FSp)</td>
<td>4.0</td>
<td>CHEM 495 (FW)</td>
</tr>
<tr>
<td>3rd Semester</td>
<td>CHEM 303* or CHEM 357 (F)</td>
<td>3.0</td>
<td>CHEM 391 (FW)</td>
</tr>
<tr>
<td>3rd Semester</td>
<td>PWS 150* (FWSpSu)</td>
<td>3.0</td>
<td>CHEM 331</td>
</tr>
<tr>
<td>3rd Semester</td>
<td>Religion Cornerstone course</td>
<td>2.0</td>
<td>SC ED 375</td>
</tr>
<tr>
<td>3rd Semester</td>
<td>Open Elective</td>
<td>2.0</td>
<td>CHEM 387</td>
</tr>
</tbody>
</table>

**Total Hours**

| 3rd Semester | 15.0 | 4th Semester | 15.0 |

**SOPHOMORE YEAR**

<table>
<thead>
<tr>
<th>Semester</th>
<th>Class Code</th>
<th>Hours</th>
<th>Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td>4th Semester</td>
<td>CHEM 352* (W) or other Req. #4</td>
<td>3.0</td>
<td>CHEM 498R fulfills Requirement #5 and G.E. Letters. If another course is chosen for Requirement #5, another Biological Sciences course from the G.E. approved list will also be required.</td>
</tr>
<tr>
<td>4th Semester</td>
<td>CHEM 357* (FWSpSu)</td>
<td>3.0</td>
<td>IP&amp;T 372</td>
</tr>
<tr>
<td>4th Semester</td>
<td>PHSCS 123 (FWSpSu)</td>
<td>3.0</td>
<td>PWS 150** (FW) or other Requirement #5</td>
</tr>
<tr>
<td>4th Semester</td>
<td>Religion Cornerstone course</td>
<td>2.0</td>
<td>IP&amp;T 372</td>
</tr>
<tr>
<td>4th Semester</td>
<td>CHEM 381M (W) or other Requirement #4</td>
<td>2.0</td>
<td>SC ED 375</td>
</tr>
</tbody>
</table>

**Total Hours**

| 4th Semester | 15.5 | 5th Semester | 15.0 |

**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.

**SENIOR YEAR**

<table>
<thead>
<tr>
<th>Semester</th>
<th>Class Code</th>
<th>Hours</th>
<th>Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td>5th Semester</td>
<td>CHEM 409R (FW)</td>
<td>1.0</td>
<td>CHEM 497R</td>
</tr>
<tr>
<td>5th Semester</td>
<td>Arts</td>
<td>3.0</td>
<td>CS 162</td>
</tr>
<tr>
<td>5th Semester</td>
<td>CPSE 402</td>
<td>2.0</td>
<td>MSCS 211</td>
</tr>
<tr>
<td>5th Semester</td>
<td>PHY 5 377</td>
<td>3.0</td>
<td>MSCS 213</td>
</tr>
<tr>
<td>5th Semester</td>
<td>PHY 5 378</td>
<td>1.0</td>
<td>MSCS 215</td>
</tr>
<tr>
<td>5th Semester</td>
<td>Civilization 2</td>
<td>3.0</td>
<td>MSCS 216</td>
</tr>
<tr>
<td>5th Semester</td>
<td>Religion Elective</td>
<td>2.0</td>
<td>MSCS 217</td>
</tr>
</tbody>
</table>

**Total Hours**

| 5th Semester | 15.0 | 6th Semester | 12.0 |

**Note:** CHEM 498R is a research capstone class and typically 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 required.
REQUIREMENT 4
A teaching minor is not required for licensure.
For students accepted into the major after December 16, 2019, grades below C in any required coursework in a teaching major or teaching minor will not be accepted. Teacher candidates must maintain a cumulative GPA of 2.7 or higher once admitted into the program and to qualify for student teaching.

REQUIREMENT 3
For additional details on admission and retention requirements for teaching majors and teaching minors, see Educator Preparation Program Requirements in the Undergraduate Catalog.

REQUIREMENT 2
Contact Education Student Services for entrance requirements into the licensure program.
A teaching minor is not required for licensure. However, it is strongly recommended.

REQUIREMENT 1
Complete 8 courses
NOTE: WITH DEPARTMENT APPROVAL, CHEM 105 MAY SUBSTITUTE FOR CHEM 111; AND CHEM 106 FOR CHEM 112; AND CHEM 107 FOR CHEM 113.
CHEM 111 - Principles of Chemistry 1
CHEM 112 - Principles of Chemistry 2
CHEM 113 - Introduction to General Chemistry Laboratory
CHEM 201 - Chemical Functioning and Safe Laboratory Practices
CHEM 227 - Principles of Chemical Analysis
CHEM 331 - Guided Learning for Chemistry Instruction
**CHEM 391 - Technical Writing Using Chemical Literature
CHEM 495 - Senior Seminar

REQUIREMENT 2
Complete 1 course
CHEM 351M - Organic Chemistry 1 - Majors
CHEM 357 - Industrial Organic Chemistry

REQUIREMENT 3
Complete 4 courses
MATH 112 - Calculus 1
MATH 113 - Calculus 2
PHSCS 121 - Introduction to Newtonian Mechanics
PHSCS 123 - Introduction to Waves, Optics, and Thermodynamics

REQUIREMENT 4
Complete 9.0 hours from the following course(s)
NOTE: CHEM 354 MAY BE TAKEN FOR EITHER 1 OR 2 CREDIT HOURS.

CHEM 322 - Modern Physics
PHSCS 225 - Introduction to Experimental Physics
PHSCS 240 - Design, Fabrication, and Use of Scientific Apparatus
PWS 150 - Environmental Biology

REQUIREMENT 6
Complete 2 options

PROFESSIONAL EDUCATION COMPONENT. COMPLETE BOTH 6.1 AND 6.2.

Licensure requirements: Contact the Education Advisement Center, 350 MCKB, 801-422-3426, to schedule the final interview to clear your application for the secondary teaching license. You should be registered for your last semester at BYU prior to the scheduled appointment.

OPTION 6.1
Complete 9 courses
CPSE 402 - Educating Students with Disabilities in Secondary Classrooms
IP&T 371 - Integrating K-12 Educational Technology 1
IP&T 372 - Integrating K-12 Educational Technology 2
IP&T 373 - Teaching in K-12 Online and Blended Learning Environments
PHYS 276 - Exploration of Teaching
PHYS 377 - Teaching Methods and Instruction
PHY S 378 - Practicum in Secondary Education
SC ED 353 - Multicultural Education for Secondary Education
SC ED 375 - Adolescent Development and Classroom Management

Note: FBI fingerprint and background clearance must be completed before enrollment into PHY S 276.

OPTION 6.2
Complete 12.0 hours from the following course(s)
PHYS 476 - Secondary Student Teaching
PHYS 496 - Academic Internship: Secondary Education

Student teachers/interns must complete three forms in their Educator accounts (PIBS, CDS, FED) and attach their TWS to the Educator account for their program. All four must be completed to be cleared for graduation.

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, usually at the end of 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 Chemistry Education Bachelor of Science degree provides preparation for chemistry/science high school teaching. High school chemistry teachers will find exciting opportunities available to help students take the first steps to becoming scientists. 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 in 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
Brigham Young University
C-104 BNSN
Provo, UT 84602
Telephone: (801) 422-6269

ADVISEMENT CENTER INFORMATION

Physical and Mathematical Sciences College Advisement Center
Brigham Young University
N-181 ESC
Provo, UT 84602
Telephone: (801) 422-2674