

# BS in Chemistry Education (692828) MAP Sheet

Physical and Mathematical Sciences, Chemistry and Biochemistry

For students entering the degree program during the 2022-2023 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.



University Core and Graduation Requirements				Suggested Sequence of Courses				
<b>University Core Requirements:</b>				<b>FRESHMAN YEAR</b>				
<b>Requirements</b>	<b>#Classes</b>	<b>Hours</b>	<b>Classes</b>	<b>1st Semester</b>		<b>JUNIOR YEAR</b>		
<b>Religion Cornerstones</b>				<b>5th Semester</b>				
Teachings and Doctrine of The Book of Mormon	1	2.0	REL A 275	CHEM 111* (F)	4.0	CHEM 462 (F) or other Req. #4	3.0	
Jesus Christ and the Everlasting Gospel	1	2.0	REL A 250	First-year Writing or A HTG 100 (FWSpSu)	3.0	IP&T 371	1.0	
Foundations of the Restoration	1	2.0	REL C 225	MATH 112 (FWSpSu)	4.0	IP&T 373	1.0	
The Eternal Family	1	2.0	REL C 200	PWS 150** (FW) or other Requirement #5	3.0	SC ED 353	3.0	
<b>The Individual and Society</b>				<b>Religion Cornerstone course</b>				
American Heritage	1-2	3-6.0	from approved list	<b>Total Hours</b>	<b>16.0</b>	PHIL 423* or Requirement 5	3.0	
Global and Cultural Awareness	1	3.0	SC ED 353*	*With department approval, CHEM 105 may be substituted for CHEM 111.				
<b>Skills</b>				**PWS 150 partially fulfills Requirement #5 and G.E. Biological Sciences.				
First Year Writing	1	3.0	from approved list	If another course is chosen for Requirement #5, another Biological Sciences course from the G.E. approved list will also be required.				
Advanced Written and Oral Communications	1	3.0	CHEM 391*	<b>2nd Semester</b>				
Quantitative Reasoning	1	4.0	MATH 112* or 113*	First-year Writing or A HTG 100	3.0	<b>6th Semester</b>		
Languages of Learning (Math or Language)	1	4.0	MATH 112* or 113*	CHEM 112* (W)	3.0	CHEM 391 (FW)	3.0	
<b>Arts, Letters, and Sciences</b>				CHEM 113* (FW)				2.0
Civilization 1	1	3.0	from approved list	CHEM 201 (FWSp)	0.5	IP&T 372	1.0	
Civilization 2	1	3.0	from approved list	MATH 113 (FWSpSu)	4.0	Social Science	3.0	
Arts	1	3.0	from approved list	Religion Cornerstone course	2.0	Religion Elective	2.0	
Letters	1	3.0	PHIL 423* (Requirement #5 opt.)	Open Elective	1.0	<b>Total Hours</b>	<b>15.0</b>	
Biological Science	1	3.0	PWS 150* or CHEM 481* (Requirement #4 opt.)	<b>Total Hours</b>	<b>15.0</b>	<b>SENIOR YEAR</b>		
Physical Science	2	7.0	CHEM 111* and PHSCS 121*	*With department approval, CHEM 106 may be substituted for CHEM 112; CHEM 107 for CHEM 113.				
Social Science	1	3.0	from approved list	<b>SOPHOMORE YEAR</b>				
<b>Core Enrichment: Electives</b>				<b>3rd Semester</b>				
Religion Electives	3-4	6.0	from approved list	CHEM 227 (FSp)	4.0	<b>7th Semester</b>		
Open Electives	Variable	Variable	personal choice	CHEM 351M* or CHEM 357 (F)	3.0	CHEM 495 (FW)	1.0	
*THESE CLASSES FILL BOTH UNIVERSITY CORE AND PROGRAM REQUIREMENTS (up to 27 hours overlap)				PHSCS 121 (FWSp)				3.0
<b>Graduation Requirements:</b>				Religion Cornerstone course				2.0
Minimum residence hours required		30.0		Civilization 1	3.0	<b>8th Semester</b>		
Minimum hours needed to graduate		120.0		<b>Total Hours</b>	<b>15.0</b>	PHY S 476 or 496 (FW)	12.0	
				*CHEM 351 may substitute for CHEM 351M.				
				<b>4th Semester</b>				
				CHEM 352M* (W) or other Req. #4				3.0
				PHSCS 123 (FWSp)				3.0
				PHY S 276R (FW)				4.0
				Religion Cornerstone course				2.0
				CHEM 381M (W) or other Requirement 4				3.0
				<b>Total Hours</b>				<b>15.0</b>
				*CHEM 352 may substitute for CHEM 352M.				

**BS in Chemistry Education (692828)**  
**2022-2023 Program Requirements (83.5 Credit Hours)**

**Licensure:** This program meets the educational requirements designed to lead to an occupationally required professional license or certificate in the state of Utah. Students pursuing occupations requiring a license or certificate in a state other than Utah should contact the appropriate BYU academic advisement center as well as the licensing agency in the state where they intend to work to seek information and guidance regarding licensure and certification requirements.

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 <https://www.schools.utah.gov/curr/licensing> or contact the Education Advisement Center, 350 MCKB, 801-422-3426.

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

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	4.0
CHEM 112 - Principles of Chemistry 2	3.0
CHEM 113 - Introductory General Chemistry Laboratory	2.0
CHEM 201 - Chemical Handling and Safe Laboratory Practices	0.5
CHEM 227 - Principles of Chemical Analysis	4.0
CHEM 331 - Guided Learning for Chemistry Instruction	3.0
*CHEM 391 - Technical Writing Using Chemical Literature	3.0
CHEM 495 - Senior Seminar	1.0

**REQUIREMENT 2** Complete 1 course

CHEM 351M - Organic Chemistry 1 - Majors	3.0
CHEM 357 - Industrial Organic Chemistry	3.0

**REQUIREMENT 3** Complete 4 courses

MATH 112 - Calculus 1	4.0
MATH 113 - Calculus 2	4.0
PHSCS 121 - Introduction to Newtonian Mechanics	3.0
PHSCS 123 - Introduction to Waves, Optics, and Thermodynamics	3.0

**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 352M - Organic Chemistry 2 - Majors	3.0
CHEM 354 - Organic Chemistry Laboratory--Majors	2.0v
CHEM 381M - Fundamentals of Biochemistry	3.0
CHEM 384 - Biochemistry Methods	1.0
CHEM 397R - Mentored Outreach and Service Learning	3.0v

You may take up to 3 credit hours.

CHEM 460 - Mathematics for Physical Chemistry	1.0
CHEM 462 - Physical Chemistry 1	3.0
CHEM 463 - Physical Chemistry 2	3.0
CHEM 464 - Physical Chemistry Laboratory 1	1.0
CHEM 465 - Physical Chemistry Laboratory 2	1.0
CHEM 468 - Biophysical Chemistry	3.0
CHEM 498R - Capstone Experience in Chemistry/Biochemistry	4.0v

You may take up to 3 credit hours.

CHEM 514 - Inorganic Chemistry	3.0
HONRS 499R - Honors Thesis	6.0v

You may take up to 3 credit hours.

**REQUIREMENT 5** Complete 6.0 hours from the following course(s)

**ONLY ONE OF GEOL 101 OR 111 CAN BE APPLIED TO THIS REQUIREMENT. ONLY ONE OF BIO 100, BIO 130, CELL 120, OR PWS 150 CAN BE APPLIED TO THIS REQUIREMENT. WITH APPROVAL, CERTAIN OTHER COURSES IN PHYSICS, GEOLOGY, MATHEMATICS, AND BIOLOGY MAY BE TAKEN TO SATISFY THIS REQUIREMENT. NOTE: ANY COURSE NOT TAKEN TO SATISFY**

**REQUIREMENT 4 CAN BE TAKEN TO SATISFY REQUIREMENT 5.**

BIO 100 - Principles of Biology	3.0
BIO 130 - Biology	4.0
CELL 120 - Science of Biology	3.0
GEOL 101 - Introduction to Geology	3.0
GEOL 111 - Physical Geology	4.0
MATH 213 - Elementary Linear Algebra	2.0
MATH 215 - Computational Linear Algebra	1.0
MATH 290 - Fundamentals of Mathematics	3.0

MATH 302 - Mathematics for Engineering 1	4.0
MATH 314 - Calculus of Several Variables	3.0
MATH 334 - Ordinary Differential Equations	3.0
PHIL 423R - History and Philosophy of Science	3.0
PHSCS 127 - Descriptive Astronomy	3.0
PHSCS 137 - Energy, Climate, and the Environment	3.0
PHSCS 220 - Introduction to Electricity and Magnetism	3.0
PHSCS 222 - Modern Physics	3.0
PHSCS 225 - Introduction to Experimental Physics	2.0
PHSCS 240 - Design, Fabrication, and Use of Scientific Apparatus	2.0
PWS 150 - Environmental Biology	3.0

**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 Classroom	2.0
IP&T 371 - Integrating K-12 Educational Technology 1	1.0
IP&T 372 - Integrating K-12 Educational Technology 2	1.0
IP&T 373 - Teaching in K-12 Online and Blended Learning Contexts	1.0
PHY S 276 - Exploration of Teaching	4.0
PHY S 377 - Teaching Methods and Instruction	3.0
PHY S 378 - Practicum in Secondary Education	1.0
*SC ED 353 - Multicultural Education for Secondary Education	3.0
SC ED 375 - Adolescent Development and Classroom Management	3.0

**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)

PHY S 476 - Secondary Student Teaching	12.0v
PHY S 496 - Academic Internship: Secondary Education	12.0v

**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.**

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2022-2023

### 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

### MENTORED RESEARCH/EXPERIENTIAL LEARNING

We strongly encourage our majors to participate in mentored learning and receive credit toward completing their major requirements. Approximately 80% of our faculty conduct independent, externally funded research and invite undergraduates to participate in on-campus mentored learning opportunities. Students initiate contact with a faculty whose research interests them. Upon acceptance to participate in a research lab, students enroll in a series of mentored research courses (CHEM 297R, 497R) throughout their academic career, culminating in a capstone research experience (CHEM 498R). Contact the department advisement center for additional information: 801-422-6269; C104 BNSN; 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