

BS in Chemistry Education (692828) MAP Sheet

Physical and Mathematical Sciences, Chemistry and Biochemistry

For students entering the degree program during the 2017-2018 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 Student Services, 120 MCKB, (801) 422-3426.



University Core and Graduation Requirements				Suggested Sequence of Courses			
University Core Requirements:							
Requirements	#Classes	Hours	Classes				
Religion Cornerstones				FRESHMAN YEAR			
Teachings and Doctrine of The Book of Mormon	1	2.0	REL A 275	<u>1st Semester</u>		JUNIOR YEAR	
Jesus Christ and the Everlasting Gospel	1	2.0	REL A 250	CHEM 111 (F)	4.0	<u>5th Semester</u>	
Foundations of the Restoration	1	2.0	REL C 225	First-year Writing	3.0	CHEM 462 (F)	3.0
The Eternal Family	1	2.0	REL C 200	MATH 112 (FWSpSu)	4.0	IP&T 286	1.0
The Individual and Society				Religion Cornerstone course	2.0	PHY S 276R	4.0
American Heritage	1-2	3-6.0	from approved list	BIO 100 (FWSpSu) or PWS 150 (FWSu) - requirement 4	3.0	Civilization 1	3.0
Global and Cultural Awareness	1	2.0	SC ED 353*	Total Hours	16.0	Religion elective	2.0
Skills				<u>2nd Semester</u>		Open electives	2.0
First Year Writing	1	3.0	from approved list	American Heritage	3.0	Total Hours	15.0
Advanced Written and Oral Communications	1	3.0	CHEM 391*	CHEM 112 (W)	3.0	<u>6th Semester</u>	
Quantitative Reasoning	1	4.0	MATH 112* or 113*	CHEM 113 (FW)	2.0	CHEM 391 (FW)	3.0
Languages of Learning (Math or Language)	1	4.0	MATH 112* or 113*	CHEM 201(FWSp)	0.5	CHEM/Science/MATH elective (requirement 4)	3.0
Arts, Letters, and Sciences				MATH 113 (FWSpSu)	4.0	SC ED 353	2.0
Civilization 1	1	3.0	from approved list	Religion Cornerstone course	2.0	SC ED 375	3.0
Civilization 2	1	3.0	from approved list	Open electives	0.5	Civilization 2	3.0
Arts	1	3.0	from approved list	Total Hours	15.0	Religion Elective	2.0
Letters	1	3.0	PHIL 423*	SOPHOMORE YEAR		Total Hours	16.0
Biological Science	1	3.0	BIO 100* or PWS 150*	<u>3rd Semester</u>		SENIOR YEAR	
Physical Science	1	3.0	CHEM 111* and PHSCS 121*, or 123*,	CHEM 227 (FSp)	4.0	<u>7th Semester</u>	
Social Science	1	3.0	from approved list	CHEM 351M (F)	3.0	CHEM 495 (FW)	1.0
Core Enrichment: Electives				PHSCS 121 (FWSp)	3.0	CHEM 497R or advanced lab elective	3.0
Religion Electives	3-4	6.0	from approved list	Religion Cornerstone course	2.0	CPSE 402	2.0
Open Electives	Variable	Variable	personal choice	Arts	3.0	PHY S 377	3.0
*THESE CLASSES FILL BOTH UNIVERSITY CORE AND PROGRAM REQUIREMENTS (25 hours overlap)				Total Hours	15.0	PHY S 378	1.0
				351 may substitute for 351M		Religion Elective	2.0
				<u>4th Semester</u>		Global and Cultural Awareness	3.0
				CHEM 352M (W)	3.0	Total Hours	15.0
				PHSCS 123 (FWSp)	3.0	<u>8th Semester</u>	
				Religion Cornerstone course	2.0	PHY S 476 or 496 (FW)	12.0
				Letters	3.0	Total Hours	12.0
				Social Science	3.0		
				Open electives	2.0		
				Total Hours	16.0		
				352 may substitute for 352M			
Graduation Requirements:				**Note: The department recommends a review of progress and planned registration with a faculty advisor by the end of the first week of classes in the first semester or term at BYU and in the semester when 30, 60, and 90 hours are completed. Call 422-6269 or come to C104 BNSN to schedule an appointment. New incoming 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.			
Minimum residence hours required		30.0		Note: 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 cost and the number of semesters to graduate.			
Minimum hours needed to graduate		120.0					

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2017-2018 Program Requirements (82.5 Credit Hours)

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For students accepted into the major after August 1, 2014, grades below C in any required coursework in a teaching major or teaching minor will not be accepted. Teacher candidates must maintain a total GPA of 3.0 or higher throughout the program and to qualify for student teaching. For details on admission and retention requirements for teaching majors and teaching minors, see Educator Preparation Program (EPP) Requirements.

The Chemistry and Biochemistry Department requires the final 10 hours of required chemistry credit to be taken in residence at BYU for this degree program. These hours may also go toward BYU's 30-hour residency requirement for graduation.

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 11 courses

NOTE: WITH DEPARTMENT APPROVAL CHEM 105 MAY SUBSTITUTE FOR CHEM 111; AND CHEM 106 FOR CHEM 112.

*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 351M - Organic Chemistry 1 - Majors	3.0
*CHEM 352M - Organic Chemistry 2 - Majors	3.0
*CHEM 391 - Technical Writing Using Chemical Literature	3.0
*CHEM 462 - Physical Chemistry 1	3.0
*CHEM 495 - Senior Seminar	1.0

REQUIREMENT 2 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 3 Complete 3.0 hours from the following course(s)

*CHEM 354 - Organic Chemistry Laboratory--Majors	2.0
*CHEM 464 - Physical Chemistry Laboratory 1	1.0
*CHEM 465 - Physical Chemistry Laboratory 2	1.0
*CHEM 497R - Undergraduate Special Problems	6.0v

You may take up to 3 credit hours.

REQUIREMENT 4 Complete 6.0 hours from the following option(s)

Only ONE of Geol 101 or 111 can be taken. With approval, certain other courses in physics, geology, mathematics, and biology may be taken to satisfy this requirement.

OPTION 4.1 Complete 6.0 hours from the following course(s)

*BIO 100 - Principles of Biology	3.0
*CHEM 463 - Physical Chemistry 2	3.0
*CHEM 481M - Biochemistry--Majors	3.0
*GEOL 101 - Introduction to Geology	3.0
*GEOL 111 - Physical Geology	4.0
*MATH 290 - Fundamentals of Mathematics	3.0
*MATH 302 - Mathematics for Engineering 1	4.0
*MATH 313 - Elementary Linear Algebra	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, Ecology, Weather, and the Environment	3.0
*PHSCS 140 - Electronics Lab	1.0
*PHSCS 145 - Experimental Methods in Physics	1.0
*PWS 150 - Environmental Biology	3.0

REQUIREMENT 5 Complete 2 options

PROFESSIONAL EDUCATION COMPONENT:

Licensure requirements: Contact the Education Advisement Center, 120 MCKB, 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 5.1 Complete 9 courses

*CPSE 402 - Educating Students with Disabilities in Secondary Classro	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	2.0
*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 5.2 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 LiveText accounts (PIBS, CDS, FED) and attach their TWS to the LiveText account for their program. All four must be completed to be cleared for graduation.

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,

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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

Brigham Young University
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Provo, UT 84602
Telephone: (801) 422-6269

ADVISEMENT CENTER INFORMATION

Physical and Mathematical Sciences College Advisement Center

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N-181 ESC
Provo, UT 84602
Telephone: (801) 422-2674