BIOCHEMISTRY, BS

Natural Sciences, Mathematics, and Engineering (nsme) (https://catalog.csub.edu/general-information/csub-information/school-natural-sciences-mathematics-engineering/)

Department of Chemistry and Biochemistry

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www.csub.edu/Chemistry (http://www.csub.edu/Chemistry/)

Program Maps for Natural Sciences, Mathematics, and Engineering (https://programmap.csub.edu/academics/interest-clusters/4e942a6e-b8e4-4b60-a1ae-334235acc581/)

Program Description

Modern chemistry occupies a central position among the sciences. The goal of chemical science is to discover the fundamental regularities by which matter in its multitude of aggregations interacts with energy in its many forms. Mathematical models and physical principles are utilized in the interpretation of chemical concepts. The organization of chemical knowledge leads to an understanding of natural phenomena in the real world of earth and life sciences.

Biochemistry is a continuously advancing field, vitally important to modern life sciences such as agriculture, biology, microbiology, medicine, pharmacy, and veterinary science. This field studies life in all biological systems, i.e., human, animal, plant, microorganisms, and viruses at the molecular level. Biochemistry is the discipline that explains the structures and the activities of living things at a sub-microscopic level combining principles of biology, chemistry, and physics. Biochemical understanding has served as the basis for major developments in health sciences related research, and significantly contributed to the formation of the biotechnology industry. The emerging knowledge has resulted in a revolution of our understanding of life forces and will have a continuously increasing impact on society.

The departmental academic program is designed to provide essential preparation for students to pursue professional careers and/or advanced studies in chemistry or related disciplines, such as Agricultural Chemistry, Biochemistry, Clinical Chemistry, Environmental Chemistry, and Forensics Chemistry. The department offers course work for chemistry majors to meet the requirements of medical and other professional schools in the health sciences, including dentistry, pharmacy, and veterinary medicine. It also cooperates with other departments and the School of Social Sciences and Education in developing a balanced program of academic and professional preparation for chemistry majors who seek teaching credentials.

Teaching Credential: Science Teacher Preparation Program Leading to a Degree in Natural Sciences, Primary Concentration in Chemistry

The California Commission on Teacher Credentialing (CCTC) has authorized CSUB to offer a single subject matter preparation program in Natural Sciences leading to a Bachelor of Arts degree. This course work satisfies the subject matter requirements for a "Secondary Teaching Credential in Science." The program consists of three components: I. Primary Concentration (major); II. Secondary Concentration (minor); and III. Breadth (cognates). Program completion leads to a BA degree in Natural Sciences with a major in the area of primary concentration and a minor in the secondary concentration. Additional information may be obtained from the Chemistry Department office (661-654-2030).

For a detailed description of the course requirements, please turn to the Natural Sciences section in this catalog.

General Chemistry and Transfer Students

Students who have taken a full year of general chemistry and then transfer to CSUB will typically receive credit for CHEM 1000, 1001, 1100, and 1600. However, topics in CHEM 1100 and CHEM 1600 are covered in greater depth than in a typical general chemistry course and some students elect to take one or both courses even after completing general chemistry.

Academic Regulations

A grade of "C" in chemistry, cognate, and all other major/minor courses is the minimal grade acceptable for progression into subsequent chemistry courses and for graduation. Students who fail to achieve at least a "C" may repeat the course. If a course is satisfactorily completed, the prior unsatisfactory grade will no longer bar a student from continuing in the Chemistry program. Credit, no-credit courses are not acceptable for the major or minor.

Program Requirements

Code	Title	Units
General Education Requirements		
Subject Area 1A: English Composition		3
Subject Area 1B: Critical Thinking		3
Subject Area 1C: Oral Communication		3
Subject Area 2: Mathematical Concepts & Quantitative Reasoning [1]		0
Subject Area 3A: Arts		3
Subject Area 3B: Humanities		3
Subject Area 4: Social and Behavioral Sciences		3
Upper Division 4 Social and Behavioral Sciences: (4UD)		3
Subject Area 5A: Physical Science [1]		0
Subject Area 5B: Biological Sciences [1]		0
Subject Area 5C: Laboratory [1]		0
Upper Division 5 Science: (5UD) [1]		0
Subject Area 6: Ethnic Studies		3
General Education Subtotal		*24*
Campus Requirements		
First-Year Seminar (FYS)		2
American Institutions: Government [2]		3

American Institutions: History		3
Junior Year Diversity & Reflection (JYDR)		3
Graduation Writing Assessment Requirement (GWAR) [3]		0
Capstone [1]		0
Campus Requirement Subtotal		*11*
Major Requirements [4]		
Lower Division [5]		
CHEM 1000	Foundations of Chemistry	3
CHEM 1001	Foundations of Chemistry Laboratory	2
CHEM 1100	Foundations of Analytical Chemistry	2
CHEM 1600	Foundations of Physical Chemistry	2
CHEM 2300	Foundations of Organic Chemistry	3
CHEM 2400	Foundations of Biochemistry	2
CHEM 2940	Research Methods in Biochemistry	2
Upper Division		
CHEM 3300	Intermediate Organic Chemistry	3
CHEM 3301	Organic Chemistry Laboratory I	2
CHEM 3400	Biochemistry of Metabolic Pathways	2
CHEM 3401	Biochemistry Laboratory I	2
CHEM 3600	Physical Chemistry:Thermodynamics and Kinetics	3
CHEM 3948	Seminar in Biochemical Literature	3
CHEM 4400	Biochemistry of Nucleic Acids	2
CHEM 4948	Senior Seminar in Biochemistry	3
Cognates		
Biology [6]		
BIOL 2010	Introductory Biology - Cells	4
BIOL 2110	Introductory Biology - Animals	4
or BIOL 2120	Introductory Biology - Plants	
Mathematics [7]		
Select one of the following:		8
MATH 2010 & MATH 2020	Calculus for the Biological and Chemical Sciences I and Calculus for Biological & Chemical Sciences II	
MATH 2310 & MATH 2320	Single Variable Calculus I for Engineers and Single Variable Calculus II for Engineers	
MATH 2510 & MATH 2520	Single Variable Calculus I and Single Variable Calculus II	
Physics [8]		
Select one of the following:		8
PHYS 2110 & PHYS 2120	College Physics I and College Physics II	
PHYS 2210 & PHYS 2220	Physics for Scientists and Engineers I and Physics for Scientists and Engineers II	
Major Subtotal		*60*
Additional Requirements for the B.S. in Biochemistry		
Lower Division Requirements: [9]		
CHEM 2200	Foundations of Inorganic Chemistry	2
or CHEM 2240	Foundations of Bioinorganic Chemistry	
Upper Division Requirements:		
CHEM 3310	Advanced Organic Chemistry	2
CHEM 3311	Organic Chemistry Laboratory II	2
CHEM 4401	Biochemistry Laboratory II	2
Select 6 additional units from the following:		6
BIOL 3010	General Genetics	
BIOL 3020	General Physiology	
BIOL 3220	Human Pathophysiology	
BIOL 3410	General Microbiology	
BIOL 3420	Food Microbiology	
BIOL 3530	Immunology	
BIOL 3540	Hematology	
BIOL 3550	Advanced Human Physiology	
BIOL 4100	Evolution	
BIOL 4200	Medical Microbiology	
BIOL 4440	Molecular Genetics	
BIOL 4450	Genomics and Bioinformatics	
BIOL 4460	Evolutionary Genetics	
CHEM 3110	Advanced Quantitative Chemical Analysis	
CHEM 3500	Concepts of Food Analysis	
CHEM 3510	Food Science	
CHEM 3610	Physical Chemistry: Quantum and Statistical Mechanics	
CHEM 4010	Symmetry and Group Theory	
CHEM 4020	Computational Chemistry	
CHEM 4130	Chemical Separations and Instrumental Analysis	
CHEM 4131	Chemical Separations and Instrumental Analysis Laboratory	
CHEM 4200	Inorganic Chemistry	
CHEM 4410	Protein Chemistry	
CHEM 4420	Plant Biochemistry	
CHEM 4830	Instruction in Chemistry	
CHEM 4500	Food Chemistry	
CHEM 4510	Advanced Nutrition and Metabolism	
CHEM 4700	Special Topics in Chemistry	
CHEM 4800	Honors Research	
Biochemistry Subtotal		*14*
Additional Units Needed Towards Graduation		**11**
Total Units		**120**

1. Satisfied in major or cognate
2. American Institution - Government (American & Constitutional Ideals) satisfies one course of the two required in Subject Area 4.
3. CHEM 3908 Seminar in Chemical Literature or CHEM 3948 Seminar in Biochemical Literature satisfies GWAR
4. The minimum GPA for these 74-75 units is 2.0 and 6 upper division units may be in Biology
5. CHEM 1000 Foundations of Chemistry satisfies Area 5A
6. BIOL 2010 Introductory Biology - Cells or BIOL 2110 Introductory Biology - Animals, or BIOL 2120 Introductory Biology - Plants satisfies Area 5B/5C
7. MATH 2010 Calculus for the Biological and Chemical Sciences I, or MATH 2310 Single Variable Calculus I for Engineers, or MATH 2510 Single Variable Calculus I satisfies Area 2
8. PHYS 2110 College Physics I, or PHYS 2210 Physics for Scientists and Engineers I satisfies Area 5A/5C
9. The unit range is 2-3 in the area.