

# BIOLOGY-CHEMISTRY, B.S. (CHEMISTRY)

The interdepartmental major in Biology-Chemistry is designed for students whose academic needs and interests include both biology and chemistry. A large segment of contemporary scientific investigation lies at the intersection of these two fields. Areas open to students by this preparation include medicine, dentistry, and graduate disciplines such as biochemistry, physiology, and molecular biology.

## Program Learning Outcomes

*Students who complete the program in Biology-Chemistry will be able to:*

1. Demonstrate an understanding of the process of science and of the concepts and theories of biology across a broad range of organizational levels: molecular, cellular, and organismal.
2. Apply key concepts and principles in quantitative analysis, biochemistry, bioinorganic chemistry, organic chemistry, and physical chemistry (thermodynamics and kinetics).
3. Use standard instrumentation and laboratory equipment to conduct scientific experiments and perform chemical characterizations.
4. Participate in the life of the Biology and/or Chemistry Department by involvement in one or more of the following areas: research, biology and/or chemistry clubs, and/or various positions of responsibility serving as graders, tutors, stockroom workers and/or teaching assistants.
5. Develop a rationally defensible integration of science and faith.
6. Be prepared for post-graduate studies or science-related careers.

Code	Title	Units
<b>Lower-Division Requirements</b>		
BIO 2010 and BIO 2010L	Cell Biology and Biochemistry (FE) and Cell Biology and Biochemistry Laboratory (FE)	4
BIO 2011 and BIO 2011L	Ecological and Evolutionary Systems (FE) and Ecological and Evolutionary Systems Laboratory (FE)	4
BIO 2012 and BIO 2012L	Organismal Biology and Organismal Biology Laboratory	4
CHE 1052 and CHE 1052L	General Chemistry I (FE) and General Chemistry I Lab (FE)	5
CHE 1053 and CHE 1053L	General Chemistry II and General Chemistry II Lab	4
CHE 2013	Analytical Chemistry	3
CHE 2094 and CHE 2094L	Organic Chemistry I and Organic Chemistry I Lab	4
CHE 2096 and CHE 2096L	Organic Chemistry II and Organic Chemistry II Lab	4
MTH 1044	Calculus with Applications (FE)	4
Choose one (1) sequence from the following:		8
Sequence 1:		
PHY 1044 and PHY 1044L	General Physics I (FE) and General Physics I Lab (FE)	
PHY 1054 and PHY 1054L	General Physics II (FE) and General Physics II Lab (FE)	

Sequence 2:

PHY 2044 and PHY 2044L	University Physics I (FE) and University Physics I Lab (FE)	
PHY 2054 and PHY 2054L	University Physics II and University Physics II Lab	
<b>Upper-Division Requirements</b>		
BIO 3045 and BIO 3045L	Genetics and Genetics Laboratory	4
BIO 3080 and BIO 3080L	Molecular Biology and Molecular Biology Laboratory	4
BIO 4097	Biology Seminar	1
CHE 3025 and CHE 3025L	Physical Chemistry I and Physical Chemistry I Lab	4
Choose one (1) of the following:		4
BIO 4050 and BIO 4050L	Advanced Biochemistry and Advanced Biochemistry Laboratory	
CHE 4050 and CHE 4050L	Advanced Biochemistry and Advanced Biochemistry Lab	
Choose one (1) course from the following:		2-3
CHE 3026	Physical Chemistry II	
CHE 3051	Organic Structure Elucidation	
CHE 3070	Instrumental Analysis	
CHE 4053	Advanced Organic Chemistry	
CHE 4066	Bioinorganic Chemistry	
CHE 4068	Advanced Inorganic Chemistry	
Choose at least five (5) units from the following: <sup>1</sup>		5
BIO 3012	Applied Plant Biology	
BIO 3015 and BIO 3015L	Microbiology and Microbiology Laboratory	
BIO 3023 and BIO 3023L	Introduction to Oceanography and Introduction to Oceanography Laboratory	
BIO 3033 and BIO 3033L	Marine Biology and Marine Biology Laboratory	
BIO 3040	Field Biology: Neotropical Ecology	
BIO 3050 and BIO 3050L	Advanced Cell Biology and Advanced Cell Biology Laboratory	
BIO 3052	Research Methodology	
BIO 3063 and BIO 3063L	Conservation Ecology and Conservation Ecology Laboratory	
BIO 3090 and BIO 3090L	Immunology and Immunology Laboratory	
BIO 4000 and BIO 4000L	Developmental Biology and Developmental Biology Laboratory	
BIO 4010 and BIO 4010L	Vertebrate Biology and Vertebrate Biology Laboratory	
BIO 4023 and BIO 4023L	Advanced Human Physiology and Advanced Human Physiology Laboratory	
BIO 4030 and BIO 4030L	Animal Behavior and Animal Behavior Laboratory	
BIO 4070	Neuroscience	

BIO 4073	Experimental Marine Ecology and BIO 4073L and Experimental Marine Ecology Laboratory
----------	---

**Total Units**

**68-69**

<sup>1</sup> Courses and their corresponding lab (if applicable) must be taken concurrently.