

# CHEMISTRY, B.S.

## Mission

The mission of the Bachelor of Science in Chemistry (<https://www.biola.edu/degrees/u/chemistry-bs/>) is to train and mentor students to become skilled scientists who will glorify God and be good stewards of His creation as they serve others in research, health care, academia, and industry.

## Degree Program

A Bachelor of Science degree in Chemistry is offered upon completion of the University baccalaureate requirements and the departmental specific requirements.

## Learning Outcomes

### Program Learning Outcomes

Upon completion of the Bachelor of Science in Chemistry, students will be able to:

1. Demonstrate an understanding of the foundational principles of chemistry (ULO 1).
2. Demonstrate an ability to solve quantitative, mechanistic, and technical problems related to chemistry (ULO 1).
3. Demonstrate safe laboratory technique, proper use of appropriate equipment, and suitable results and data analysis (ULO 1).
4. Obtain and use appropriate chemical literature and resource materials (ULO 1).
5. Summarize the key issues in science and faith and recognize the harmony possible while studying God's creation (ULO 1, 2, and 3).

Each Program Learning Outcome (PLO) listed above references at least one of the University Learning Outcomes (ULO 1, 2, 3), which may be found in the General Information section (<https://catalog.biola.edu/general-information/#UniversityLearningOutcomes>) of this catalog.

## Program Requirements

### GPA Requirements

To continue in the program a student is required to have a cumulative GPA of 2.5 or higher in their first year of chemistry, physics and/or math courses taken at Biola. Depending on the major, these courses may include: CHEM 105, CHEM 106, CHEM 115, CHEM 116, CHEM 301, CHEM 302, CHEM 311, and CHEM 312.

## Curriculum Requirements

### Integration Seminar Requirement

Students enrolled in the Bachelor of Science in Chemistry degree program are required to take BBST 4653 Integration Seminar: Christianity and the Natural Sciences, or another approved Integration Seminar topic (see advisor).

Code	Title	Credits
Chemistry majors automatically meet the Core Curriculum requirement of 9 credits in integration seminar, science, and mathematics within the major. The foreign language requirement is met by two years of high school study in the same language or four credits of college foreign language.		

Program Courses		
CHEM 107	Introduction to Chemistry <sup>1</sup>	3
CHEM 105 & CHEM 115	General Chemistry I and General Chemistry I Lab	4
CHEM 106 & CHEM 116	General Chemistry II and General Chemistry II Lab	4
CHEM 301 & CHEM 311	Organic Chemistry I and Laboratory in Organic Chemistry I	4
CHEM 302 & CHEM 312	Organic Chemistry II and Laboratory in Organic Chemistry II	4
CHEM 350 & CHEM 351	Analytical Chemistry and Analytical Chemistry Lab	4
CHEM 402	Physical Chemistry I	3
CHEM 406	Physical Chemistry Lab	1
CHEM 410	Instrumental Analysis	2
CHEM 411	General Biochemistry I	3
CHEM 470	Seminar in Advanced Chemistry and Biochemistry	1
or CHEM 480	Internship	
or CHEM 490	Directed Research	
MATH 150	Calculus I	4
MATH 151	Calculus II	4
PHSC 124	Data Analysis and Presentation	1
PHSC 132 & PHSC 134	General Physics I: Mechanics and Heat and General Physics I Laboratory	4
PHSC 233 & PHSC 237	General Physics II: Electricity and Magnetism and General Physics II Laboratory	4
PHSC 234	General Physics III: Waves, Optics and Modern Physics	4
PHSC 460	Capstone Seminar	1
BBST 4653	Integration Seminar: Christianity and the Natural Sciences <sup>2</sup>	3
Select at least 6 credits from the following Chemistry, Math, or Physics courses:		6
CHEM 332	Environmental Chemistry	
CHEM 352	Fundamentals of Material Science	
CHEM 390	Introduction to Food Chemistry	
CHEM 412	General Biochemistry II	
CHEM 413	Laboratory in General Biochemistry	
CHEM 431	Advanced Organic Chemistry Lab	
CHEM 470	Seminar in Advanced Chemistry and Biochemistry	
CHEM 480	Internship	
CHEM 490	Directed Research	
MATH 250	Calculus III	
MATH 291	Linear Algebra	
MATH 318	Biostatistics	
MATH 335	Ordinary Differential Equations	
PHSC 311	Computer Techniques in Science and Engineering	

PHSC 321	Circuits and Instrumentation I	
PHSC 331	Thermodynamics	
Select 6 credits from the following upper-division Chemistry courses:		6
CHEM 360	Inorganic Chemistry	
CHEM 405	Physical Chemistry II	
CHEM 430	Advanced Organic Chemistry	
<b>Program Course Requirements: 67-70 credits</b>		
<b>Core Curriculum Requirements (<a href="https://catalog.biola.edu/academic-policies/undergraduate-core-curriculum-program/">https://catalog.biola.edu/academic-policies/undergraduate-core-curriculum-program/</a>)</b>		<b>54-58</b>
<b>Total Credits</b>		<b>121-128</b>

<sup>1</sup> CHEM 107 is waived for students who meet the qualifications to enter CHEM 105. See the current Placement Options for (<https://www.biola.edu/academic-advising/incoming/placement-exams/chemistry-105/>)CHEM 105 for more information.

<sup>2</sup> Fulfills the BBST 465 Biblical and Theological Studies Integration Seminar requirement.

## Course Sequence

**NOTE:** The course sequence table is designed by the major department and is one way that the classes will work out properly in sequence for your major. However, there are alternative or flexible ways to rotate some of the classes within the same year/level and sometimes between year levels. Please contact your major department advisor to discuss flexible alternatives in scheduling the sequence of your classes.

Taking coursework during the summer session may also be an option to accelerate your degree path.

See Core Curriculum Program section (<https://catalog.biola.edu/academic-policies/undergraduate-core-curriculum-program/>) for a list of approved Core Curriculum courses.

## Chemistry, B.S.

First Year		
Fall	Credits Spring	Credits
BBST 103 or 165	3 BBST 103 or 165	3
CHEM 105 & CHEM 115 (or CHEM 107 if needed per Department)	4 CHEM 106 & CHEM 116	4
ENGL 100 or 112	3 MATH 151	4
GNST 102	1 PHSC 132 & PHSC 134	4
MATH 150	4	
PHSC 124	1	
	<b>16</b>	<b>15</b>

Second Year		
Fall	Credits Spring	Credits
BBST 209 or 210	3 BBST 209 or 210	3
CHEM 301 & CHEM 311	4 BBST 251	3
Philosophy (see Core Curriculum)	3 CHEM 302 & CHEM 312	4
KNES 107	1 Fine Arts (see Core Curriculum)	3
PHSC 233 & PHSC 237	4 PHSC 234	4
	<b>15</b>	<b>17</b>

Third Year		
Fall	Credits Spring	Credits
BBST 365	3 BBST 354	3
CHEM 350 & CHEM 351	4 CHEM 410	2
ENGL 313	3 Chemistry Elective (upper-division)	3
Writing Competency Requirement	Chemistry, Math, or Physics Elective	3
HIST 200, 201, or POSC 225	3 Behavioral Science (see Core Curriculum)	3
Communication (see Core Curriculum)	3 KNES Activity (see Core Curriculum)	1
Writing Competency Requirement ( <a href="https://catalog.biola.edu/academic-policies/undergraduate-requirements-policies/#WritingCompetencyRequirement">https://catalog.biola.edu/academic-policies/undergraduate-requirements-policies/#WritingCompetencyRequirement</a> )	Graduation Application due in Registrar's Office	
	<b>16</b>	<b>15</b>

Fourth Year		
Fall	Credits Spring	Credits
BBST 300/400 Bible Elective	3 BBST 300/400 Bible Elective	3
CHEM 402	3 BBST 4653 (fulfills BBST 465 Integration Seminar requirement)	3
CHEM 406	1 CHEM 470, 480, or 490	1
CHEM 411	3 PHSC 460	1
Chemistry, Math, or Physics Elective	3 Chemistry Elective (upper-division)	3
	Literature (see Core Curriculum)	3
	<b>13</b>	<b>14</b>

**Total Credits 121**

Note: If you have taken 2 years of the same language in high school, you have fulfilled your foreign language requirement. Otherwise, contact the Modern Language Department for placement test instructions.

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## Chemistry, B.S.

First Year		
Fall	Credits Spring	Credits
HNRS 101	4 HNRS 105	4
HNRS 102	4 HNRS 106	4
CHEM 105 & CHEM 115 (or CHEM 107 if needed per Department)	4 CHEM 106 & CHEM 116	4
GNST 102	1 MATH 151	4
MATH 150	4	

PHSC 124	1	
	<b>18</b>	<b>16</b>

**Second Year**

<b>Fall</b>	<b>Credits Spring</b>	<b>Credits</b>
HNRS 210	4 HNRS 230	4
HNRS 215	4 HNRS 231	4
CHEM 301 & CHEM 311	4 CHEM 302 & CHEM 312	4
KNES 107	1 PHSC 132 & PHSC 134	4
	<b>13</b>	<b>16</b>

**Third Year**

<b>Fall</b>	<b>Credits Spring</b>	<b>Credits</b>
HNRS 324	4 HNRS 337	4
HNRS 326	2 HNRS 339	2
CHEM 350 & CHEM 351	4 CHEM 410	2
PHSC 233 & PHSC 237	4 Chemistry, Math, or Physics Elective	3
Writing Competency Requirement ( <a href="https://catalog.biola.edu/academic-policies/undergraduate-requirements-policies/#WritingCompetencyRequirement">https:// catalog.biola.edu/academic- policies/undergraduate- requirements-policies/ #WritingCompetencyRequirement</a> )	KNES Activity (see Core Curriculum)	1
	PHSC 234	4
	<b>14</b>	<b>16</b>

**Fourth Year**

<b>Fall</b>	<b>Credits Spring</b>	<b>Credits</b>
HNRS 443	4 HNRS 458	4
CHEM 402	3 BBST 4653 (fulfills BBST 465 Integration Seminar requirement)	3
CHEM 406	1 CHEM 470, 480, or 490	1
CHEM 411	3 PHSC 460	1
Chemistry, Math, or Physics Elective	3 Chemistry Elective (upper- division)	3
Chemistry Elective (upper- division)	3	
	<b>17</b>	<b>12</b>

**Total Credits 122**

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