BIOCHEMISTRY (BS)

Degree Requirements and Curriculum

In addition to the program requirements on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (https://catalog.calpoly.edu/academic-standards-policies/general-requirements-bachelors-degree/#generaleducationtext) section of this catalog, including:

- 40 units of upper-division courses
- 2.0 GPA
- Graduation Writing Requirement (GWR)
- U.S. Cultural Pluralism (USCP)

Note: No Major, Support or Concentration courses may be selected as credit/no credit. In addition, no more than 12 units of cooperative or internship courses can count towards your degree requirements.

Code	Title	Units
MAJOR COURSES		
CHEM 1103	Research Methods I	1
CHEM 1120	Fundamentals of Chemical Structure and Properties (5A & 5C) [1]	4
CHEM 1122	Fundamentals of Chemical Reactivity	4
CHEM 2201	Undergraduate Research	1
or CHEM 2203	Research Methods II	
CHEM 2242	Organic Chemistry I	5
CHEM 3302	Undergraduate Seminar II	1
CHEM 3330	Foundations of Chemical Analysis	4
CHEM 3352	Biochemistry (Upper-Division 2/5) [1]	4
CHEM 3354	Metabolism	3
CHEM 3356	Genetic Information Processing	4
CHEM 3390	Physical Chemistry for Life Sciences	3
CHEM 3391	Physical Chemistry for Life Sciences Laboratory	1
CHEM 4453	Molecular Biology Techniques	2
or CHEM 4454	Protein Techniques	
CHEM 4461	Senior Project I	1
CHEM 4462	Senior Project II	1
Select from the following:		2-3
CHEM 4450	Nutritional Biochemistry	
CHEM 4452	Physical Biochemistry Methods and Applications	
CHEM 4456	Chemical Biology	
CHEM 4457	Chemistry of Drugs and Poisons	
CHEM 4458	Neurochemistry	
Select from the following:		3-4
BIO 3351	Principles of Genetics	
BIO 3352	Principles of Animal Physiology	
BIO 4433	Neuroscience	
BIO 4434	Endocrinology	
BIO 4451	Bioinformatics Applications	
BIO 4452	Cell Biology	
BIO 4455	Developmental Biology	
BIO 4456	Immunology	
BIO 4458	Hematology	
MCRO 4402	General Virology	
MCRO 4423	Medical Microbiology	
MCRO 4424	Microbial Physiology and Biochemistry	
Concentration or Advanced Elective Courses		**17**

(See Concentration below)		
Advanced Electives [2,3,4]		
CHEM 2220	Inorganic Chemistry I: D-Block Chemistry	
CHEM 2221	Inorganic Chemistry I Laboratory	
CHEM 2244	Organic Chemistry II	
CHEM 2270	Special Topics	
CHEM 3320	Inorganic Chemistry II: Group Theory and Spectroscopy	
CHEM 3321	Inorganic Chemistry II Laboratory	
CHEM 3370	Marine Chemistry	
CHEM 3372	Environmental Chemistry	
CHEM 3374	Chemical and Biological Warfare	
CHEM 3380	Foundations of Macromolecular Chemistry	
CHEM 3392	Physical Chemistry I	
CHEM 3393	Physical Chemistry Laboratory I	
CHEM 4400	Special Problems for Advanced Undergraduates	
CHEM 4401	Advanced Undergraduate Research [5]	
CHEM 4404	Learning Assistant Seminar [6]	
CHEM 4415	College Teaching Practicum	
CHEM 4420	Inorganic Chemistry III: Transition Metals in Context	
CHEM 4430	Instrumental Analysis	
CHEM 4432	Advanced Techniques in Chemical Analysis	
CHEM 4440	Advanced Organic Chemistry - Mechanisms	
CHEM 4442	Advanced Organic Chemistry - Synthesis	
CHEM 4444	Advanced Organic Chemistry Laboratory	
CHEM 4450	Nutritional Biochemistry	
CHEM 4452	Physical Biochemistry Methods and Applications	
CHEM 4453	Molecular Biology Techniques	
CHEM 4454	Protein Techniques	
CHEM 4456	Chemical Biology	
CHEM 4457	Chemistry of Drugs and Poisons	
CHEM 4458	Neurochemistry	
CHEM 4470	Special Advanced Topics	
CHEM 4471	Special Advanced Laboratory	
CHEM 4480	Polymer Synthesis and Characterization	
CHEM 4481	Polymer Synthesis and Characterization Laboratory	
CHEM 4482	Coatings and Formulations	
CHEM 4483	Coatings and Formulations Laboratory	
CHEM 4484	Functional Polymeric Materials	
CHEM 4485	Cooperative Education Experience [6]	
CHEM 4486	Surface Chemistry of Materials	
CHEM 4490	Computational Chemistry	
CHEM 4495	Cooperative Education Experience [6]	
SCM/ENGR 3302	The Learn By Doing Lab Teaching Practicum [6]	
SUPPORT COURSES		
BIO 1151	Life: Molecules and Cells (5B) [1]	4
MATH 1261	Calculus I (2) [1]	4
MATH 1262	Calculus II	4
MCRO 2224	General Microbiology I	4
PHYS 1141	General Physics I	4
PHYS 1143	General Physics II	4
GENERAL EDUCATION (GE)		
(See GE program requirements below)		30

FREE ELECTIVES	
Free Electives [7]	3-4
Total Units	**120**

1. Required in Major or Support; also satisfies General Education (GE) requirement.
2. Courses taken to meet a Major requirement cannot be double-counted in the Advanced Electives.
3. Consultation with advisor is recommended prior to selecting advanced electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.
4. A minimum of 5 units must be taken at the 3000-4000 level.
5. Maximum of 4 units may be applied toward Advanced Electives from CHEM 4401.
6. Maximum of 2 units may be applied toward Advanced Electives from the following: CHEM 4404, CHEM 4485, CHEM 4495, or SCM/ENGR 3302.
7. If a General Education (GE) course is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.

Concentrations

Polymers and Coatings

Code	Title	Units
REQUIRED COURSES		
CHEM 3380	Foundations of Macromolecular Chemistry	4
CHEM 4480	Polymer Synthesis and Characterization	3
CHEM 4481	Polymer Synthesis and Characterization Laboratory	2
CHEM 4482	Coatings and Formulations	3
CHEM 4483	Coatings and Formulations Laboratory	2
CHEM 4486	Surface Chemistry of Materials	3
Total Units		**17**

General Education (GE) Requirements

General Education (GE) Requirements

- 43 units required, 13 of which are specified in Major and/or Support.
- If any of the remaining 30 Units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (https://catalog.calpoly.edu/academic-standards-policies/general-requirements-bachelors-degree/#generaleducationtext).
- A grade of C- or better is required in one course in each of the following GE Areas: 1A (English Composition), 1B (Critical Thinking), 1C (Oral Communication), and 2 (Mathematics and Quantitative Reasoning).

Lower-Division General Education

Area 1	**English Communication and Critical Thinking**	
1A	Written Communication	3
1B	Critical Thinking	3
1C	Oral Communication	3
Area 2	**Mathematics and Quantitative Reasoning**	
2	Mathematics and Quantitative Reasoning (3 units in Support)	0
Area 3	**Arts and Humanities**	
3A	Arts	3
3B	Humanities: Literature, Philosophy, Languages other than English	3
Area 4	**Social and Behavioral Sciences (Area 4 courses must come from at least two different course prefixes.)**	
4A	American Institutions (Title 5, Section 40404 Requirement)	3
4B	Social and Behavioral Sciences	3
Area 5	**Physical and Life Sciences**	
5A	Physical Sciences (3 units in Major) [1]	0
5B	Life Sciences (3 units in Support) [1]	0
5C	Laboratory (may be embedded in a 5A or 5B course) (1 units in Major) [1]	0

Area 6	**Ethnic Studies**	
6	Ethnic Studies	3
Upper-Division General Education		
Upper-Division 2/5	Mathematics and Quantitative Reasoning or Physical and Life Sciences (3 units in Major) [1]	0
Upper-Division 3	Arts and Humanities	3
Upper-Division 4	Social and Behavioral Sciences (Area 4 courses must come from at least two different course prefixes.)	3
Total Units		**30**

[1] Required in Major or Support; also satisfies General Education (GE) requirement.