BS BIOCHEMISTRY

Program Learning Objectives

1. Understand and apply the fundamental concepts of chemistry in the following areas: calculation and estimation, structure, and properties of atoms, ions and molecules, chemical bonding and chemical reactivity.
2. Use techniques and modern tools to conduct, design, analyze, and interpret experiments in chemistry and biochemistry.
3. Communicate effectively with the scientific community.
4. Apply concepts of math, physical and biological sciences to chemical problems.
5. Integrate the concepts, skills and attitudes from a general education with his/her major program to understand and explain the impact of chemistry, science and technology on issues in global, economic, environmental, and societal contexts.

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 section of this catalog, including:

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

Note: No major, support or concentration courses may be selected as credit/no credit.

MAJOR COURSES

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 124</td>
<td>General Chemistry for Physical Science and Engineering I (B3 &amp; B4)</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 125</td>
<td>General Chemistry for Physical Science and Engineering II</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 126</td>
<td>General Chemistry for Physical Science and Engineering III</td>
<td>4</td>
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<tr>
<td>CHEM 203</td>
<td>Undergraduate Seminar I</td>
<td>1</td>
</tr>
<tr>
<td>CHEM 216</td>
<td>Organic Chemistry I</td>
<td>5</td>
</tr>
<tr>
<td>CHEM 217</td>
<td>Organic Chemistry II</td>
<td>3</td>
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<tr>
<td>CHEM 218</td>
<td>Organic Chemistry III</td>
<td>3</td>
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<tr>
<td>CHEM 221</td>
<td>Organic Chemistry Laboratory I</td>
<td>2</td>
</tr>
<tr>
<td>CHEM 303</td>
<td>Undergraduate Seminar II</td>
<td>1</td>
</tr>
<tr>
<td>CHEM 324</td>
<td>Organic Chemistry Laboratory II</td>
<td>2</td>
</tr>
<tr>
<td>CHEM 331</td>
<td>Quantitative Analysis</td>
<td>2</td>
</tr>
<tr>
<td>CHEM 351</td>
<td>Physical Chemistry I</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 352</td>
<td>Physical Chemistry II</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 353</td>
<td>Physical Chemistry III</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 354</td>
<td>Physical Chemistry Laboratory</td>
<td>2</td>
</tr>
<tr>
<td>CHEM 371</td>
<td>Biochemical Principles</td>
<td>5</td>
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<tr>
<td>CHEM 372</td>
<td>Metabolism</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 373</td>
<td>Molecular Biology</td>
<td>3</td>
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<tr>
<td>CHEM 403</td>
<td>Undergraduate Seminar III: Senior Project</td>
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<tr>
<td>CHEM/BIO 475</td>
<td>Molecular Biology Laboratory</td>
<td>3</td>
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</table>

Select from the following: 3

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>BIO 476</td>
<td>Gene Expression Laboratory</td>
<td></td>
</tr>
<tr>
<td>CHEM 474</td>
<td>Protein Techniques Laboratory</td>
<td></td>
</tr>
</tbody>
</table>

Select from the following: 12/18

Polymers and Coatings Concentration (18 units)

Approved Advanced Biochemistry Electives (12 units)

One course must be a lecture, and at least two courses must be from List A.

List A:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIO/Chem 308</td>
<td>Genetic Engineering Technology (Area F)</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 349</td>
<td>Chemical and Biological Warfare</td>
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<tr>
<td>CHEM 324</td>
<td>Introduction to Air Pollution</td>
<td></td>
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<tr>
<td>SCM 335</td>
<td>Nuclear Science and Society</td>
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</tr>
<tr>
<td>SCM 360</td>
<td>Selected Environmental Issues of California’s Central Coast</td>
<td>4</td>
</tr>
</tbody>
</table>

CHEM 252  Laboratory Glassblowing
CHEM 302  Marine Chemistry
CHEM 341  Environmental Chemistry: Water Pollution
CHEM 357  Physical Chemistry III Lab
CHEM 377  Chemistry of Drugs and Poisons
CHEM 400  Special Problems for Advanced Undergraduates 5
CHEM 401  Advanced Undergraduate Research 6
CHEM 405  Advanced Physical Chemistry
CHEM 414  Advanced Organic Chemistry - Mechanisms
CHEM 419  Bioorganic Chemistry
CHEM 420  Advanced Organic Chemistry - Synthesis
CHEM 439  Instrumental Analysis
CHEM 441  Bioinformatics Applications
CHEM 444  Polymers & Coatings I
CHEM 445  Polymers & Coatings II
CHEM/MATE 446  Surface Chemistry of Materials
CHEM 447  Polymers and Coatings Laboratory I
CHEM 448  Polymers and Coatings Laboratory II
CHEM 449  Polymers and Coatings Internship
CHEM 450  Polymers and Coatings III
CHEM 451  Polymers and Coatings Laboratory III
CHEM 454  Functional Polymeric Materials
CHEM 458  Instrumental Organic Qualitative Analysis
CHEM 463  Honors Research
CHEM 465  College Teaching Practicum
CHEM 466  Learning Assistant Seminar
CHEM 470  Selected Advanced Topics
CHEM 474  Protein Techniques Laboratory
CHEM 477  Biochemical Pharmacology
CHEM 481  Inorganic Chemistry
CHEM 484  Inorganic Chemistry Laboratory
CHEM 485  Cooperative Education Experience 5
Concentration
Students may select the following concentration instead of advanced approved biochemistry electives in Major Courses

- Polymers and Coatings (http://catalog.calpoly.edu/collegesandprograms/collegeofsciencemathematics/chemistrybiochemistry/bsbiochemistry/polymersandcoatingsconcentration)

General Education (GE) Requirements

- 72 units required, 16 of which are specified in Major and/or Support.
- See the complete GE course listing (http://catalog.calpoly.edu/generalrequirementsbachelorsdegree/#generaleducationtext).
- Minimum of 12 units required at the 300 level.

Area A

Communication
A1 Expository Writing 4
A2 Oral Communication 4
A3 Reasoning, Argumentation and Writing 4

Area B

Science and Mathematics
B1 Mathematics/Statistics (8 units in Support) 0
B2 Life Science (4 units in Support) 0
B3 Physical Science (4 units in Major) 0
B4 One lab taken with either a B2 or B3 course

Area C

Arts and Humanities
C1 Literature 4
C2 Philosophy 4
C3 Fine/Performing Arts 4
C4 Upper-division elective 4
Area C elective (Choose one course from C1-C5) 4

Area D/E

Society and the Individual
D1 The American Experience (Title 5, Section 40404 requirement) 4
D2 Political Economy 4
D3 Comparative Social Institutions 4
D4 Self Development (CSU Area E) 4
D5 Upper-division elective 4

Area F

Technology
F Upper-division elective 4

Total units 56

1 Required in Major/Support; also satisfies GE.
2 Students should take CHEM 331 as soon as possible after completing CHEM 126.
3 Consultation with advisor is recommended prior to selecting approved electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.
4 These courses also satisfy Area F requirements.
5 No more than 2 units may apply toward Approved Advanced Biochemistry Electives.
6 No more than 4 units may apply to Approved Advanced Biochemistry Electives.