

# CHEMISTRY (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        |
|----------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|--------------|
| <b>MAJOR COURSES</b>                                                 |                                                                                                 |              |
| CHEM 1103                                                            | Research Methods I                                                                              | 1            |
| CHEM 1120                                                            | Fundamentals of Chemical Structure and Properties (5A & 5C) <sup>1</sup>                        | 4            |
| CHEM 1122                                                            | Fundamentals of Chemical Reactivity                                                             | 4            |
| CHEM 2201<br>or CHEM 2203                                            | Undergraduate Research<br>Research Methods II                                                   | 1            |
| CHEM 2220                                                            | Inorganic Chemistry I: D-Block Chemistry                                                        | 3            |
| CHEM 2221                                                            | Inorganic Chemistry I Laboratory                                                                | 1            |
| 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) <sup>1</sup>                                                  | 4            |
| CHEM 3380                                                            | Foundations of Macromolecular Chemistry                                                         | 4            |
| CHEM 3392                                                            | Physical Chemistry I                                                                            | 3            |
| CHEM 3393                                                            | Physical Chemistry Laboratory I                                                                 | 1            |
| CHEM 4461                                                            | Senior Project I                                                                                | 1            |
| CHEM 4462                                                            | Senior Project II                                                                               | 1            |
| Advanced Lecture/Laboratory Subdiscipline Extension Electives        |                                                                                                 |              |
| Select courses from two different subdisciplines from the following: |                                                                                                 | 8-10         |
| Analytical                                                           |                                                                                                 |              |
| CHEM 4430                                                            | Instrumental Analysis                                                                           |              |
| Biochemistry                                                         |                                                                                                 |              |
| CHEM 3356                                                            | Genetic Information Processing                                                                  |              |
| Inorganic                                                            |                                                                                                 |              |
| CHEM 3320<br>& CHEM 3321                                             | Inorganic Chemistry II: Group Theory and Spectroscopy<br>and Inorganic Chemistry II Laboratory  |              |
| Organic                                                              |                                                                                                 |              |
| CHEM 2244                                                            | Organic Chemistry II                                                                            |              |
| Physical Chemistry                                                   |                                                                                                 |              |
| CHEM 3394<br>& CHEM 3395                                             | Physical Chemistry II<br>and Physical Chemistry Laboratory II                                   |              |
| Polymers                                                             |                                                                                                 |              |
| CHEM 4480<br>& CHEM 4481                                             | Polymer Synthesis and Characterization<br>and Polymer Synthesis and Characterization Laboratory |              |
| <b>Concentration or Advanced Elective Courses</b>                    |                                                                                                 | <b>13-16</b> |
| (See Concentration below)                                            |                                                                                                 |              |
| Advanced Electives <sup>2,3</sup>                                    |                                                                                                 |              |

|                                     |                                                                                                 |            |
|-------------------------------------|-------------------------------------------------------------------------------------------------|------------|
| CHEM 2244                           | Organic Chemistry II                                                                            |            |
| CHEM 3320<br>& CHEM 3321            | Inorganic Chemistry II: Group Theory and Spectroscopy<br>and Inorganic Chemistry II Laboratory  |            |
| CHEM 3354                           | Metabolism                                                                                      |            |
| CHEM 3356                           | Genetic Information Processing                                                                  |            |
| CHEM 3370                           | Marine Chemistry                                                                                |            |
| CHEM 3372                           | Environmental Chemistry                                                                         |            |
| CHEM 3374                           | Chemical and Biological Warfare                                                                 |            |
| CHEM 3394<br>& CHEM 3395            | Physical Chemistry II<br>and Physical Chemistry Laboratory II                                   |            |
| CHEM 4401                           | Advanced Undergraduate Research <sup>4</sup>                                                    |            |
| CHEM 4404                           | Learning Assistant Seminar <sup>5</sup>                                                         |            |
| 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 4451                           | Bioinformatics Applications                                                                     |            |
| 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<br>& CHEM 4481            | Polymer Synthesis and Characterization<br>and 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 <sup>5</sup>                                                   |            |
| CHEM 4486                           | Surface Chemistry of Materials                                                                  |            |
| CHEM 4487                           | Polymers and Coatings Internship                                                                |            |
| CHEM 4490                           | Computational Chemistry                                                                         |            |
| CHEM 4495                           | Cooperative Education Experience <sup>5</sup>                                                   |            |
| SCM/ENGR 3302                       | The Learn By Doing Lab Teaching Practicum <sup>5</sup>                                          |            |
| <b>SUPPORT COURSES</b>              |                                                                                                 |            |
| BIO 1151                            | Life: Molecules and Cells (5B) <sup>1</sup>                                                     | 4          |
| MATH 1261                           | Calculus I (2) <sup>1</sup>                                                                     | 4          |
| MATH 1262                           | Calculus II                                                                                     | 4          |
| MATH 2263                           | Calculus III                                                                                    | 3          |
| PHYS 1141                           | General Physics I                                                                               | 4          |
| PHYS 1143                           | General Physics II                                                                              | 4          |
| <b>GENERAL EDUCATION (GE)</b>       |                                                                                                 |            |
| (See GE program requirements below) |                                                                                                 | 30         |
| <b>FREE ELECTIVES</b>               |                                                                                                 |            |
| Free Electives <sup>6, 7</sup>      |                                                                                                 | 3-6        |
| <b>Total Units</b>                  |                                                                                                 | <b>120</b> |

- <sup>1</sup> Required in Major or Support; also satisfies General Education (GE) requirement.
- <sup>2</sup> Courses taken to meet a Major requirement cannot be double-counted in the concentration or in the Advanced Electives.
- <sup>3</sup> 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.
- <sup>4</sup> Maximum of 4 units may be applied toward Advanced Electives from CHEM 4401.
- <sup>5</sup> Maximum of 2 units may be applied toward Advanced Electives from the following: CHEM 4404, CHEM 4485, CHEM 4495, or SCM/ENGR 3302.
- <sup>6</sup> 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.
- <sup>7</sup> Free Electives may need to be at the 3000-4000 level to ensure completion of the required minimum of 40 units of upper-division courses.

## Concentrations

### Polymers and Coatings

| Code                    | Title                                             | Units     |
|-------------------------|---------------------------------------------------|-----------|
| <b>REQUIRED COURSES</b> |                                                   |           |
| 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         |
| <b>Total Units</b>      |                                                   | <b>13</b> |

## 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

|               |                                                                                                               |   |
|---------------|---------------------------------------------------------------------------------------------------------------|---|
| <b>Area 1</b> | <b>English Communication and Critical Thinking</b>                                                            |   |
| 1A            | Written Communication                                                                                         | 3 |
| 1B            | Critical Thinking                                                                                             | 3 |
| 1C            | Oral Communication                                                                                            | 3 |
| <b>Area 2</b> | <b>Mathematics and Quantitative Reasoning</b>                                                                 |   |
| 2             | Mathematics and Quantitative Reasoning (3 units in Support) <sup>1</sup>                                      | 0 |
| <b>Area 3</b> | <b>Arts and Humanities</b>                                                                                    |   |
| 3A            | Arts                                                                                                          | 3 |
| 3B            | Humanities: Literature, Philosophy, Languages other than English                                              | 3 |
| <b>Area 4</b> | <b>Social and Behavioral Sciences (Area 4 courses must come from at least two different course prefixes.)</b> |   |
| 4A            | American Institutions (Title 5, Section 40404 Requirement)                                                    | 3 |
| 4B            | Social and Behavioral Sciences                                                                                | 3 |
| <b>Area 5</b> | <b>Physical and Life Sciences</b>                                                                             |   |
| 5A            | Physical Sciences (3 units in Major) <sup>1</sup>                                                             | 0 |
| 5B            | Life Sciences (3 units in Support) <sup>1</sup>                                                               | 0 |
| 5C            | Laboratory (may be embedded in a 5A or 5B course) (1 units in Major) <sup>1</sup>                             | 0 |
| <b>Area 6</b> | <b>Ethnic Studies</b>                                                                                         |   |
| 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) <sup>1</sup> | 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         |
| <b>Total Units</b> |                                                                                                        | <b>30</b> |

<sup>1</sup> Required in Major or Support; also satisfies General Education (GE) requirement.