# Biochemistry

## Bachelor of Science Degree Requirements

### General Education Requirements (72 units)

#### A: Basic Subjects (16 units)

<table>
<thead>
<tr>
<th>Qtr/Yr</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- A1: Written Communication
- A2: Oral Communication
- A3: Critical Thinking
- A4: Mathematics

A minimum C grade is required for all courses in Block A.

#### AI: American Institutions (8 units)

<table>
<thead>
<tr>
<th>Qtr/Yr</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- US History
- US Constitution

#### B: Natural Sciences (8 units)

<table>
<thead>
<tr>
<th>Qtr/Yr</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- B1: Biological (with lab)
- B2: Physical (with lab)

#### C: Humanities (12 units)

<table>
<thead>
<tr>
<th>Qtr/Yr</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### D: Social Sciences (12 units)

<table>
<thead>
<tr>
<th>Qtr/Yr</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### E: Lifelong Understanding (4 units)

<table>
<thead>
<tr>
<th>Qtr/Yr</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Upper Division Theme (12 units)

- Natural Sciences and Mathematics
- Social Sciences
- Humanities

Courses listed or cross-listed with major cannot be taken to satisfy theme requirements.

### University Requirements (14-16 units)

- NSS 101 or 301
- ENGL 102
- WPE (UNIV 400)
- (d) Diversity
- (d) Diversity

### Major Requirements (122 units)

#### Lower Division Core (74 units)

<table>
<thead>
<tr>
<th>Qtr/Yr</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- BIOL 100A: Introductory Biology I (5)
- BIOL 100B: Introductory Biology II (5)
- CHEM 101: General Chemistry I (5)
- CHEM 102: General Chemistry II (5)
- CHEM 103: General Chemistry III (5)
- CHEM 201: Quantitative Analysis (5)
- CHEM 280: Introduction to Biomolecules (3)
- CHEM 291A: Organic Chemistry (3)
- CHEM 291B: Organic Chemistry (3)
- CHEM 292A: Organic Chemistry Laboratory (2)
- CHEM 292B: Organic Chemistry Laboratory (2)
- MATH 206: Calculus I Differentiation (4)
- MATH 207: Calculus II Integration (4)
- MATH 208: Calculus III Sequences, Series ... (4)
- MATH 209: Calculus IV Several Variables (4)
- PHYS 211: Mechanics (5)
- PHYS 212: Waves, Optics and Thermodynamics (5)
- PHYS 213: Electricity and Magnetism (5)

#### Upper Division Core (36 units)

- CHEM 301: Organic Chemistry (3)
- CHEM 318: Introduction to Inorganic Chemistry (3)
- CHEM 360: Writing for Chemists (4)
- CHEM 401: Physical Chemistry I (4)
- CHEM 402: Physical Chemistry II (4)
- CHEM 431A: Biochemistry (3)
- CHEM 431B: Biochemistry (3)
- CHEM 431C: Biochemistry (3)
- CHEM 432A: Biochemistry Laboratory (2)
- CHEM 432B: Biochemistry Laboratory (2)
- MICR 300: General Microbiology (5)

#### Upper Division Electives (12 units, select one course from each area)

- Chemistry:
- Development / Physiology:
- Genetics / Biometrics:

### Notes

**2.0 GPA and 188 units required to graduate**

- Academic Standing:
  - Overall GPA:
  - Major GPA:
  - CSULA GPA:
  - Units:

*Students must earn a grade of C- or higher in all courses used to meet major requirements.*
### Lower Division Core (14 units)

- **Biol 100A**: Introductory Biology (5)  
  - MATH 104A
- **Biol 100B**: Introductory Biology II (5)  
  - MATH 104A and MATH 106A with grades of C or higher; MATH 105 recommended.
- **Chem 101**: General Chemistry I (5)  
  - High school chemistry & physics; 2 years of H.S. algebra; satisfactory score on placement examination. See catalog for more details.
- **Chem 102**: General Chemistry II (5)  
  - CHEM 101
- **Chem 103**: General Chemistry II R (5)  
  - CHEM 102
- **Chem 101**: Quantitative Analysis (5)  
  - CHEM 103
- **Chem 200**: Introduction to Biochemistry (5)  
  - CHEM 200 and CHEM 101 or equivalent
- **Chem 251A**: Organic Chemistry I (5)  
  - CHEM 250A, CHEM 250B or one year of General Chemistry
- **Chem 251B**: Organic Chemistry II (3)  
  - Originally CHEM 308B, CHEM 308A
- **Chem 252A**: Organic Chemistry Laboratory I (2)  
  - Originally CHEM 308, CHEM 250A. Corequisite: CHEM 251B
- **Chem 252B**: Organic Chemistry Laboratory II (2)  
  - Originally CHEM 308B, CHEM 250A and CHEM 251B. Corequisite: CHEM 301

**Math 206**: Calculus I Differentiation (4)  
- MATH 104A and MATH 106A, each with a minimum C grade or satisfactory score on placement examination; students with a grade less that B- in either MATH 204 A or MATH 206 must enroll concurrently in MATH 206P.
- **Math 207**: Calculus II Integration (4)  
  - MATH 206 with a minimum C grade; students with a grade less than B- in either MATH 206 must enroll concurrently in MATH 207P.
- **Math 208**: Calculus III Sequences, Series and Coordinate Systems (4)  
  - MATH 207 with a minimum C grade; students with a grade less than B- in either MATH 207 must enroll concurrently in MATH 208P.
- **Phys 211**: Mechanics (5)  
  - High school physics or equivalent, or permission of the department, MATH 206 or equivalent (may be taken concurrently).
- **Phys 213**: Waves, Optics and Thermodynamics (5)  
  - PHYS 211. Prerequisites or corequisites: CHEM 301
- **Phys 213**: Electricity and Magnetism (5)  
  - PHYS 213. Prerequisites or corequisites: MATH 206.

### Upper Division Core (30 units)

- **Chem 301**: Organic Chemistry (3)  
  - Originally CHEM 301C, CHEM 301B
- **Chem 318**: Introduction to Inorganic Chemistry (3)  
  - CHEM 103 or one year of General Chemistry
- **Chem 360**: Writing for Chemists (4)  
  - Satisfactory completion of the Graduation Writing Assessment Requirement (GWARM), CHEM 318 or instructor consent
- **Chem 401**: Physical Chemistry I (4)  
  - CHEM 103 or equivalent; MATH 206, PHYS 213
- **Chem 403**: Physical Chemistry II (4)  
  - MATH 206
- **Chem 431A**: Biochemistry (3)  
  - CHEM 301
- **Chem 431B**: Biochemistry (3)  
  - CHEM 431A
- **Chem 431C**: Biochemistry (3)  
  - CHEM 431B
- **Chem 432A**: Biochemistry Laboratory (2)  
  - CHEM 200 and 431A
- **Chem 432B**: Biochemistry Laboratory (2)  
  - CHEM 200 and 431B
- **Chem 430**: General Microbiology (5)  
  - BIOL 200, CHEM 102

### Upper Division Electives (12 units; select one course from each area)

#### Chemistry

- **Chem 403**: Physical Chemistry II (6)  
  - MATH 205 or 405, CHEM 301 or one year of General Chemistry, PHYS 214.
- **Chem 412A**: Physical Chemistry Laboratory (3)  
  - CHEM 403 or 405
- **Chem 412B**: Physical Chemistry Laboratory (3)  
  - CHEM 403
- **Chem 412**: Inorganic Chemistry (3)  
  - CHEM 206
- **Chem 420**: Advanced Organic Chemistry I (4)  
  - CHEM 301
- **Chem 423**: Polymer Chemistry (3)  
  - CHEM 301 and EM 367
- **Chem 434**: Bioinformatics and Computational Biology (4)  
  - Grade of C or higher in BIOL 100C and CS 201, upper division or graduate level standing.
- **Chem 438**: Bioorganic & Bioorganic Chemistry (4)  
  - CHEM 431A or 435
- **Chem 444**: Drug Discovery & Development (4)  
  - CHEM 350 and either BIOL 380 or CHEM 430 or CHEM 431A
- **Chem 462**: Instrumental Analysis (6)  
  - CHEM 350, CHEM 430
- **Chem 465**: Undergraduate Directed Study (1-5)  
  - 2.5 S.U.P.A in chemistry courses or one advanced lab course, consent of instructor to act as advisor, ability to assume responsibility for independent work and to prepare written and oral reports.

#### Development / Physiology

- **Biol 414**: General Entomology (4)  
  - Grade of C or higher in BIOL 100C, CHEM 301
- **Biol 430**: Plant Physiology (5)  
  - Grade of C or higher in BIOL 100C, CHEM 301
- **Biol 431**: Plant Physiology II (5)  
  - BIOL 430
- **Biol 432**: Fundamentals of Toxicology (4)  
  - BIOL 300, CHEM 301 and CHEM 302B
- **Biol 434**: Animal Physiology I (4)  
  - BIOL 300
- **Biol 435**: Animal Physiology II (4)  
  - BIOL 300
- **Biol 436**: Neurobiology: Neuronphysiology (4)  
  - BIOL 300
- **Biol 437**: Advanced Cell Physiology (4)  
  - BIOL 300
- **Biol 439**: Endocrinology (4)  
  - BIOL 300
- **Biol 446**: Molecular Biology of the Brain (3)  
  - BIOL 300
- **Biol 449**: Neurobiology of Development (4)  
  - BIOL 300
- **Biol 467**: Physiological Zoology (4)  
  - BIOL 300
- **Biol 476**: Physiology of Animal Life (4)  
  - BIOL 300
- **Biol 491**: General Medical Microbiology (4)  
  - MICR 301 with grade of C or higher
- **Biol 492**: Pathogenic Bacteriology (5)  
  - MICR 301 with grade of C or higher
- **Biol 504**: Immunology & Serology (4)  
  - MICR 301, CHEM 200B, 200A, prerequisite or corequisite: CHEM 200A
- **Biochem 495**: General Virology (3)  
  - MICR 301, CHEM 200B, 200A, prerequisite: CHEM 200A
- **Biochem 496**: General Microbiology (5)  
  - MICR 301, MICR 401, prerequisite: CHEM 200A
- **Biochem 497**: General Microbiology (4)  
  - MICR 401

### Genetics / Biometrics

- **Biol 300**: Genetics (4)  
  - Grade of C or higher in BIOL 100C, MATH 105 for Biology and Biotechnology majors and MATH 104B for other majors.
- **Biol 340**: General Genetics (4)  
  - BIOL 300
- **Biol 413**: Molecular Genetics (4)  
  - BIOL 300 or MICR 401 or CHEM 431A and CHEM 431C (may be taken concurrently)
- **Biol 415**: Population Genetics (4)  
  - BIOL 413, CHEM 200A
- **Biol 416**: Molecular Genetics (4)  
  - BIOL 415, CHEM 200A
- **Biol 417**: Green-Plant Genetics (4)  
  - BIOL 416 or MICR 402, BIOL 300 or CHEM 431A and 431A
- **Biol 418**: Evolution (4)  
  - BIOL 300
- **Biol 473**: Molecular Ecology (4)  
  - BIOL 300
- **Biochem 430**: Microbial Genetics (3)  
  - Grade of C or higher in MICR 300
- **Biochem 431**: Microbial Genetics (3)  
  - MICR 300
- **Biochem 432**: Advanced Topics in Molecular Life Sciences (2)  
  - Biochem 431, Biochem 432B, BIOCHEM 433B, or CHEM 434A; advanced parallel courses: Biochem 433B, CHEM 434A
- **Biochem 433**: Advanced Topics in Bioinformatics & Computational Biology (2)  
  - Biochem 431, Biochem 432B