### Bachelor of Science in Biology: Concentration in Cell and Molecular Biology - Quantitative Reasoning Category III/IV and Stretch English

- **120 Total Units Required**
- **Minimum Number of Units in Major: 68**

#### Course Title | Units
---|---
**First Semester**
ENG 104 | Writing the First Year: Finding Your Voice Stretch I | 3
MATH 197 | Prelude to Calculus I (Prerequisite for MATH 226) | 3
GE Area A | | 3
GE Area C | | 3
GE Area D | | 3
---|---
**Units** | 15

**Second Semester**
CHEM 115 | General Chemistry I: Essential Concepts of Chemistry (Major Lower-Division Core) | 5
ENG 105 | Writing the First Year: Finding Your Voice Stretch II (A2) | 3
MATH 198 | Prelude to Calculus II (Prerequisite for MATH 226, B4) | 3
PHYS 111 & PHYS 112 | General Physics I and General Physics I Laboratory (Major Lower-Division Core, B1, B3) | 4
---|---
**Units** | 15

**Third Semester**
BIOL 230 | Introductory Biology I (Major Lower-Division Core) | 5
---|---
**Units** | 15

**Fourth Semester**
Biol 240 | Introductory Biology II (Major Lower-Division Core) | 5
CHEM 233 | Organic Chemistry I (Major Lower-Division Core) | 3
PHYS 121 & PHYS 122 | General Physics II and General Physics II Laboratory (Major Lower-Division Core) | 4
---|---
Select One (Major Lower-Division Core): | | 3-4
BIOL 358 | Forensic Genetics: Math Matters | |
BIOL 458 | Biometry | |
CSC 210 | Introduction to Computer Programming | |
MATH 227 | Calculus II | 5
---|---
**Units** | 15-16

**Fifth Semester**
CHEM 130 | General Organic Chemistry (Hidden Prerequisite for BIOL 355 and CHEM 349) | 3
CHEM 335 | Organic Chemistry II (Major Upper-Division Core) | 3
---|---
GE Area A | | 3
GE Area C | | 3
GE Area D | | 3
---|---
**Units** | 15

**Sixth Semester**
BIOL 355 | Genetics (Major Upper-Division Core) | 3
BIOL 350 | Cell Biology (Major Upper-Division Core) | 3
Bachelor of Science in Biology: Concentration in Cell and Molecular Biology - Quantitative Reasoning Category III/IV and Stretch English

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
<th>Units</th>
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<tbody>
<tr>
<td>CHEM 349</td>
<td>General Biochemistry (Major Upper-Division Core)</td>
<td>3</td>
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<tr>
<td>GE Area C</td>
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<tr>
<td>SF State Studies or University Elective</td>
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<tr>
<td><strong>Seventh Semester</strong></td>
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<tr>
<td>BIOL 351GW</td>
<td>Experiments in Cell and Molecular Biology - GWAR (Major Upper-Division Core)</td>
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<tr>
<td>BIOL 357</td>
<td>Molecular Genetics (Major Upper-Division Core)</td>
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<tr>
<td>Select Major Electives Requirement (11 Units Total) - Take Two</td>
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<td>6-7</td>
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<tr>
<td>GE Area D</td>
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<tr>
<td><strong>Eighth Semester</strong></td>
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<tr>
<td>Select Major Electives Requirement (11 Units Total) - Take Two</td>
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<td>4-6</td>
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<tr>
<td>GE Area UD-C: Upper-Division Arts and/or Humanities (Consider SF State Studies Course)</td>
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<tr>
<td>GE Area UD-D: Upper-Division Social Sciences (Consider SF State Studies Course)</td>
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<td>SF State Studies or University Elective</td>
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<tr>
<td><strong>Total Units</strong></td>
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<td>120-124</td>
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</table>

1. ENG 114 can only be taken if you complete Directed Self-Placement (DSP) and select ENG 114; if you choose ENG 104/ENG 105 through DSP you will satisfy A2 upon successful completion of ENG 105 in the second semester; multilingual students may be advised into alternative English courses.

2. Depending on courses completed through Early Start, students in Pathway/Category III or IV may be required to enroll in a support course to complement their Quantitative Reasoning/B4 requirement. There are multiple course options for this pathway. Before enrolling in a B4 course, students should verify their MATH Pathway/Category in their Student Center. Information regarding the courses that correspond with your MATH Pathway/Category can be found on the Developmental Studies Office Website.

3. To avoid taking additional units, it is recommended that you meet SF State Studies requirements (AERM, GP, ES, SJ) within your GE.

4. GE Areas B2 (Life Science) and B3 (Laboratory Science) are satisfied upon completion of BIOL 240.

5. Students who plan to pursue a Ph.D. should complete at least two semesters of calculus and one semester of physical chemistry.

6. Upper-Division General Education, Physical, and Life Sciences (UD-B) is satisfied upon completion of BIOL 355.

7. Students may take CHEM 340 and CHEM 341 in lieu of CHEM 349 upon advisement. In this case, CHEM 341 counts towards the upper-division elective unit requirement.

8. CHEM 340 and CHEM 341 are alternative courses for CHEM 349. CHEM 341 fulfills the requirements for CHEM 349 and can be taken instead. If taken, CHEM 341 counts as an upper-division elective unit.

9. Major Electives (11 units)
   Select 11 units upon advisement. At least one elective course must have an upper-division laboratory component. Graduate level courses may be used upon advisement.
   - BIOL 332 Health Disparities in Cancer (3 units) (AERM, GP, SJ)
   - BIOL 337 Evolution (3 units)
   - BIOL 344GW Research Skills - GWAR (3 units)
   - BIOL 349 Bioethics (3 units) (UD-B, SJ)
   - BIOL 356 Honors Genetics (2 units)
   - BIOL 358 Forensic Genetics: Math Matters (4 units)
   - BIOL 380 Evolutionary Developmental Biology (3 units)
   - BIOL 382 Developmental Biology (3 units)
   - BIOL 401 General Microbiology (3 units)
   - BIOL 402 GW General Microbiology Laboratory - GWAR (3 units)*
   - BIOL 411 Environmental Microbiology (3 units)
   - BIOL 420 General Virology (3 units)
   - BIOL 425 Emerging Diseases (3 units)
   - BIOL 435 Immunology (3 units)
   - BIOL 436 Immunology Laboratory (2 units)*
   - BIOL 442 Microbial Physiology (3 units)
   - BIOL 443 Microbial Physiology Laboratory (2 units)*
   - BIOL 446 Microbial Genomics (4 units)
   - BIOL 453 General Parasitology (3 units)
   - BIOL 454 Parasitology Laboratory (1 unit)*
   - BIOL 458 Biometry (4 units)
   - BIOL 490 Ecology of Infectious Diseases (4 units)
   - BIOL 525 Plant Physiology (3 units)
   - BIOL 526 Plant Molecular Physiology Laboratory (2 units)*
   - BIOL 615 Molecular Pathophysiology (3 units)
   - BIOL 618 Biology of Aging (3 units)
   - BIOL 623 Pharmacology (3 units)
   - BIOL 630 Animal Physiology (3 units)
   - BIOL 631GW Animal Physiology Laboratory - GWAR (4 units)*
   - BIOL 638 Bioinformatics and Genome Annotation (4 units)*
   - BIOL 640 Cellular Neurosciences (3 units)
   - BIOL 652 Science Education Partners in Biology (4 units)
   - BIOL 699 Independent Study in Biology (1-3 units)*
   - CHEM 343 Biochemistry Laboratory (3 units)*

* Course fulfills the upper-division laboratory elective requirement.