

# 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 |
|------------------------|--|-------|
| <b>First Semester</b>  |  |       |
| ENG 104                | Writing the First Year: Finding Your Voice Stretch I <sup>1</sup>                      | 3     |
| MATH 197               | Prelude to Calculus I (Prerequisite for MATH 226) <sup>2,3</sup>                       | 3     |
| GE Area A <sup>4</sup> |  | 3     |
| GE Area C              |  | 3     |
| GE Area D              |  | 3     |
| Units                  |  | 15    |
| <b>Second Semester</b> |  |       |
| 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) <sup>1</sup>                | 3     |
| MATH 198               | Prelude to Calculus II (Prerequisite for MATH 226, B4) <sup>2,3</sup>                  | 3     |
| PHYS 111 & PHYS 112    | General Physics I and General Physics I Laboratory (Major Lower-Division Core, B1, B3) | 4     |
| Units                  |  | 15    |
| <b>Third Semester</b>  |  |       |
| BIOL 230               | Introductory Biology I (Major Lower-Division Core)                                     | 5     |

|   |  |       |
|---|--|-------|
| CHEM 215 & CHEM 216                     | General Chemistry II: Quantitative Applications of Chemistry Concepts and General Chemistry II Laboratory: Quantitative Applications of Chemistry Concepts (Major Lower-Division Core) | 5     |
| MATH 226                                | Calculus I (Major Lower-Division Core, B4) <sup>2,3</sup>  | 4     |
| GE Area E                               |  | 3     |
| Units                                   |  | 17    |
| <b>Fourth Semester</b>                  |  |       |
| BIOL 240                                | Introductory Biology II (Major Lower-Division Core) <sup>5</sup>   | 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 <sup>6</sup>   |       |
| Units                                   |  | 15-16 |
| <b>Fifth Semester</b>                   |  |       |
| 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    |
| <b>Sixth Semester</b>                   |  |       |
| BIOL 355                                | Genetics (Major Upper-Division Core) <sup>7</sup>  | 3     |
| BIOL 350                                | Cell Biology (Major Upper-Division Core)   | 3     |

|  |  |         |
|--|--|---------|
| CHEM 349   | General Biochemistry (Major Upper-Division Core) <sup>8</sup>                | 3       |
| GE Area C  |  | 3       |
| SF State Studies or University Elective  |  | 3       |
| Units  |  | 15      |
| <b>Seventh Semester</b>  |  |         |
| BIOL 351GW   | Experiments in Cell and Molecular Biology - GVAR (Major Upper-Division Core) | 4       |
| BIOL 357   | Molecular Genetics (Major Upper-Division Core)                               | 3       |
| Select Major Electives Requirement (11 Units Total) - Take Two <sup>9</sup>            |  | 6-7     |
| GE Area D  |  | 3       |
| Units  |  | 16-17   |
| <b>Eighth Semester</b>   |  |         |
| Select Major Electives Requirement (11 Units Total) - Take Two <sup>9</sup>            |  | 4-6     |
| GE Area UD-C: Upper-Division Arts and/or Humanities (Consider SF State Studies Course) |  | 3       |
| GE Area UD-D: Upper-Division Social Sciences (Consider SF State Studies Course)        |  | 3       |
| SF State Studies or University Elective  |  | 2       |
| Units  |  | 12-14   |
| Total Units  |  | 120-124 |

<sup>1</sup> 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.

<sup>2</sup> 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 (<http://cms.sfsu.edu/content/student-center>). Information regarding the courses that correspond with your MATH Pathway/Category can be found on the Developmental Studies Office Website (<http://developmentalstudies.sfsu.edu>).

<sup>4</sup> To avoid taking additional units, it is recommended that you meet SF State Studies requirements (AERM, GP, ES, SJ) within your GE.

<sup>5</sup> GE Areas B2 (Life Science) and B3 (Laboratory Science) are satisfied upon completion of BIOL 240.

<sup>6</sup> Students who plan to pursue a Ph.D. should complete at least two semesters of calculus and one semester of physical chemistry.

<sup>7</sup> Upper-Division General Education, Physical, and Life Sciences (UD-B) is satisfied upon completion of BIOL 355.

<sup>8</sup> 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.

<sup>9</sup> **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 - GVAR (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 402GW General Microbiology Laboratory - GVAR (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 units)\*
- 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 - GVAR (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 I Laboratory (3 units)\*

\* Course fulfills the upper-division laboratory elective requirement.