

BACHELOR OF SCIENCE IN BIOLOGY: CONCENTRATION IN MICROBIOLOGY - QUANTITATIVE REASONING CATEGORY III/IV AND STRETCH ENGLISH

120 Total Units Required

Minimum Number of Units in the Major: 68

Course	Title	Units
First Semester		
BIOL 230	Introductory Biology I	5
ENG 104	Writing the First Year: Finding Your Voice Stretch I ¹	3
MATH 197	Prelude to Calculus I (Prerequisite for MATH 226) ^{2,3}	3
GE Area A ⁴		3
	Units	14
Second Semester		
BIOL 240	Introductory Biology II (Major Lower-Division Core)	5
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) ¹	3
MATH 198	Prelude to Calculus II (Prerequisite for MATH 226, B4) ^{2,3}	3
	Units	16
Third Semester		
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) ^{2,3}	4

PHYS 111 & PHYS 112	General Physics I and General Physics I Laboratory (Major Lower-Division Core, B1, B3)	4
GE Area E		3
	Units	16
Fourth Semester		
CHEM 130	General Organic Chemistry (Major Lower-Division Core)	3
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
GE Area A		3
GE Area D		3
	Units	16
Fifth Semester		
BIOL 355	Genetics (Major Upper-Division Core)	3
Major Lower-Division Requirement – Select One ⁵		3-4
GE Area C - Take Two		6
GE Area D		3
	Units	16
Sixth Semester		
BIOL 401 & BIOL 402GW	General Microbiology and General Microbiology Laboratory - GVAR (Major Upper-Division Core)	6
CHEM 335	Organic Chemistry II (Major Upper-Division Core)	3
GE Area C		3
GE Area D		3
	Units	15
Seventh Semester		
BIOL 442	Microbial Physiology (Major Upper-Division Core)	3
CHEM 340 or CHEM 349	Biochemistry I (Major Upper-Division Core) or General Biochemistry	3
Upper-Division Electives (12 Units Total) - Take Two ⁶		6
GE Area UD-D: Upper-Division Social Sciences (Consider SF State Studies Course)		3
	Units	15
Eighth Semester		
Upper-Division Electives (12 Units Total) - Take Two ⁶		6

GE Area UD-C: Upper-Division Arts and/or Humanities (Consider SF State Studies Course)	3
SF State Studies or University Elective	3
Units	12
Total Units	120

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 GE Area 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 (<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>).

³ QR Category III students with a grade of B or higher in high school pre-calculus in the past year may be able to enroll in MATH 226. Please see a department advisor.

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

⁵ **Lower-Division Requirement - Select One**

BIOL 358 Forensic Genetics: Math Matters (4 units)

BIOL 458 Biometry (4 units)

CSC 210 Introduction to Computer Programming (3 units)

MATH 124 Elementary Statistics (3 units) (B4)

MATH 227 Calculus II (4 units)

MATH 228 Calculus III (4 units)

⁶ **Electives in Microbiology**

Select 12 units from the following courses, including at least three laboratory courses with approval of an advisor. Any course taken as an elective that does not appear on this list will not be counted towards completion of the Microbiology degree requirements unless the course is approved by an advisor prior to enrolling in it.

BIOL 351GW Experiments in Cell and Molecular Biology - GVAR (4 units)

BIOL 420 General Virology (3 units)

BIOL 425 Emerging Diseases (3 units)

BIOL 430 Medical Microbiology (3 units)

BIOL 431 Medical Microbiology Laboratory (2 units)

BIOL 435 Immunology (3 units)

BIOL 436 Immunology Laboratory (2 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 490 Ecology of Infectious Diseases (4 units)

BIOL 625 Hematology (3 units)

BIOL 638 Bioinformatics and Genome Annotation (4 units)

BIOL 699 Independent Study in Biology (1-3 units)

BIOL 741/CHEM 741/ERTH 741 Electron Microscopy (4 units)

CHEM 336 Organic Chemistry II Laboratory (2 units)

or CHEM 343 Biochemistry I Laboratory (3 units)