

BACHELOR OF ARTS IN GENERAL BIOLOGY ROADMAP – QUANTITATIVE REASONING CATEGORY III/IV AND ENG 114

120 Total Units Required

Minimum Number of Units in the Major: 49

This roadmap is a suggested plan of study and does not replace meeting with an advisor. Please note that students may need to adjust the actual sequence of courses based on course availability. Please consult an advisor in your major program for further guidance.

Course	Title	Units
First Semester		
BIOL 230	Introductory Biology I (Major Lower-Division Core)	5
ENG 114	Writing the First Year: Finding Your Voice (A2) ¹	3
MATH 197	Prelude to Calculus I (Prerequisite for MATH 226 and CHEM 115) ^{2,3}	3
GE Area A ⁴		3
Units		14
Second Semester		
CHEM 115	General Chemistry I: Essential Concepts of Chemistry (Major Lower-Division Core)	5
MATH 198	Prelude to Calculus II (Prerequisite for MATH 226, B4) ^{2,3}	3
or SF State Studies or University Elective ⁵		
PHYS 111 & PHYS 112	General Physics I and General Physics I Laboratory (Major Lower-Division Core, B1, B3)	4
GE Area E		3
Units		15
Third Semester		
BIOL 240	Introductory Biology II (Major Lower-Division Core)	5
CHEM 215	General Chemistry II: Quantitative Applications of Chemistry Concepts (Major Lower-Division Core)	3
Select One (Major Lower-Division Core, B4): ²		4-5

MATH 124 & MATH 123	Elementary Statistics and Mathematics for Elementary Statistics	
MATH 226	Calculus I ³	
PHYS 121 & PHYS 122	General Physics II and General Physics II Laboratory (Major Lower-Division Core)	4
Units		16-17
Fourth Semester		
CHEM 130	General Organic Chemistry (Major Lower-Division Core)	3
Ecology Course - Select One ⁶		3-4
GE Area A		3
GE Area C		3
GE Area D		3
Units		15-16
Fifth Semester		
BIOL 355	Genetics (Major Upper-Division Core)	3
Physiology Course - Select One ⁷		5-7
Physiology Lab or University Elective ⁸		
GE Area C		3
GE Area D		3
Units		14-16
Sixth Semester		
Cell Biology Course - Select One ⁹		4-8
Cell Biology Lab or University Elective ⁸		
Evolutionary or Organismal Biology Course - Select One ¹⁰		3-5
GE Area C		3
GE Area F [±]		3
U.S. and California Government (http://bulletin.sfsu.edu/undergraduate-education/american-institutions/#usg)		3
Units		17-21
Seventh Semester		
Upper-Division Major Electives - Select 4-8 Units in Consultation with an Advisor ¹¹		4
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 - Take Two ⁵		5
Units		15
Eighth Semester		
Upper-Division Major Electives - Take One ¹¹		3
or University Elective if already satisfied		
SF State Studies or University Elective - Take Four ⁵		12
Units		15
Total Units		121-129

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 To determine the best B4 course option, students should complete the online advising activity at mathadvising.sfsu.edu (<https://mathadvising.sfsu.edu/>). Questions? Contact Gator Smart Start. (<https://gatorsmartstart.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 the **SF State Studies** (AERM, GP, ES, SJ) requirements within your GE or major.

⁵ **Complementary Studies**

Students in the B.A. Biology program will satisfy the Complementary Studies Requirement with the completion of courses in chemistry, physics, and mathematics that are required for the major.

⁶ **Ecology Courses - Select One**

BIOL 482 Ecology (4 units)
 BIOL 490 Ecology of Infectious Diseases (4 units)
 BIOL 529GW Plant Ecology - GVAR (4 units)*
 BIOL 532 Restoration Ecology (3 units)
 BIOL 534 Wetland Ecology (4 units)
 BIOL 580 Limnology (3 units)
 BIOL 582 Biological Oceanography & Limnology (4 units)
 BIOL 585 Marine Ecology (3 units)
 BIOL 586GW Marine Ecology Laboratory - GVAR (4 units)*

⁷ **Physiology Courses**

BIOL 442 Microbial Physiology (3 units)
 BIOL 525 Plant Physiology (3 units)
 BIOL 612 Human Physiology (3 units)
 BIOL 630 Animal Physiology (3 units)

⁸ **Laboratory Course Associated with a Course in the Physiology or Cell Biology Course**

BIOL 351GW Experiments in Cell and Molecular Biology - GVAR (4 units)*
 BIOL 402GW General Microbiology Laboratory - GVAR (3 units)*
 BIOL 436 Immunology Laboratory (2 units)
 BIOL 443 Microbial Physiology Laboratory (2 units)
 BIOL 454 Parasitology Laboratory (1 units)
 BIOL 526 Plant Molecular Physiology Laboratory (2 units)
 BIOL 613GW Human Physiology Laboratory - GVAR (3 units)*
 BIOL 631GW Animal Physiology Laboratory - GVAR (4 units)*

⁹ **Cell Biology Courses**

BIOL 350 Cell Biology (3 units)
 BIOL 358 Forensic Genetics: Math Matters (4 units)
 BIOL 401 General Microbiology (3 units)
 BIOL 435 Immunology (3 units)
 BIOL 453 General Parasitology (3 units)
 CHEM 349 General Biochemistry (3 units)

¹⁰ **Evolutionary or Organismal Biology Courses**

BIOL 328 Human Anatomy (4 units)
 BIOL 337 Evolution (3 units)
 BIOL 380 Evolutionary Developmental Biology (3 units)
 BIOL 382 Developmental Biology (3 units)
 BIOL 425 Emerging Diseases (3 units)
 BIOL 453 General Parasitology (3 units)
 BIOL 454 Parasitology Laboratory (1 units)
 BIOL 460 General Entomology (4 units)
 BIOL 475GW Herpetology - GVAR (3 units)*
 BIOL 478GW Ornithology - GVAR (4 units)*
 BIOL 500 Evolution and Diversity of Plants (4 units)
 BIOL 502 Biology of the Algae (3 units)
 BIOL 504 Biology of the Fungi (4 units)
 BIOL 505 Comparative Anatomy of Vascular Plants (4 units)
 BIOL 514 Plant Biodiversity and California Field Botany (5 units)
 BIOL 555 Marine Invertebrate Zoology (4 units)
 BIOL 570GW Biology of Fishes - GVAR (4 units)*
 BIOL 600 Animal Behavior (3 units)
 BIOL 638 Bioinformatics and Genome Annotation (4 units)

¹¹ **Upper-Division Electives (4-8 units)**

Select 4-8 units in consultation with an advisor from among all upper-division Biology courses. Only one of the following courses can be included among those selected: BIOL 317, BIOL 327, BIOL 330, and BIOL 349. Up to 3 units of BIOL 699 can also be used towards the total of 4-8 units. All Biology courses that have BIOL 230 and/or BIOL 240 as prerequisites can also be used as electives. This includes courses already listed previously under each of the category subheadings, but not used to satisfy the requirements of those categories.

BIOL 332 Health Disparities in Cancer (3 units) (AERM, GP, S,J)
BIOL 337 Evolution (3 units)
BIOL 344GW Research Skills - GWAR (3 units)*
BIOL 350 Cell Biology (3 units)
BIOL 358 Forensic Genetics: Math Matters (4 units)
BIOL 401 General Microbiology (3 units)
BIOL 425 Emerging Diseases (3 units)
BIOL 453 General Parasitology (3 units)
BIOL 460 General Entomology (4 units)
BIOL 461 Insect Taxonomy (4 units)
BIOL 464 Medical Entomology (3 units)
BIOL 470 Natural History of Vertebrates (4 units)
BIOL 475GW Herpetology - GWAR (3 units)*
BIOL 478GW Ornithology - GWAR (4 units)*
BIOL 482 Ecology (4 units)
BIOL 490 Ecology of Infectious Diseases (4 units)
BIOL 492 Comparative Anatomy of Vertebrates (4 units)
BIOL 500 Evolution and Diversity of Plants (4 units)
BIOL 502 Biology of the Algae (3 units)
BIOL 504 Biology of the Fungi (4 units)
BIOL 514 Plant Biodiversity and California Field Botany (5 units)
BIOL 525 Plant Physiology (3 units)
BIOL 526 Plant Molecular Physiology Laboratory (2 units)
BIOL 529GW Plant Ecology - GWAR (4 units)*
BIOL 530 Conservation Biology (3 units)
BIOL 532 Restoration Ecology (3 units)
BIOL 534 Wetland Ecology (4 units)
BIOL 550 Plant and Animal Interactions (4 units)
BIOL 555 Marine Invertebrate Zoology (4 units)
BIOL 556 Natural History of Marine Invertebrates (4 units)
BIOL 570GW Biology of Fishes - GWAR (4 units)*
BIOL 577 Climate and Ecological Interactions (4 units)
BIOL 580 Limnology (3 units)
BIOL 582 Biological Oceanography & Limnology (4 units)
BIOL 600 Animal Behavior (3 units)
BIOL 607 Conservation and Management of Marine Mammals (3 units)
BIOL 609 Physics in Medicine (3 units)
BIOL 612 Human Physiology (3 units)
BIOL 614 Vertebrate Histology (4 units)
BIOL 616 Cardiorespiratory Physiology (3 units)
BIOL 620 Endocrinology (3 units)
BIOL 621 Reproductive Physiology (3 units)
BIOL 622 Hormones and Behavior (3 units)
BIOL 623 Pharmacology (3 units)
BIOL 627 Biophysics (3 units)
BIOL 630 Animal Physiology (3 units)
BIOL 638 Bioinformatics and Genome Annotation (4 units)
BIOL 640 Cellular Neurosciences (3 units)
BIOL 652 Science Education Partners in Biology (4 units)

* Students must complete at least one GWAR course in order to graduate.

± Given catalog rights, fall 2022 transfer students do not need to complete an Area F course.