

# BACHELOR OF ARTS IN BIOLOGY – BIOL ASSOCIATE DEGREE FOR TRANSFER ROADMAP

This is a sample pathway for students who transfer to San Francisco State University in the current Bulletin year with an AS-T in Biology. Thirty-two units in the major (BIOL 230/BIOL 240, CHEM 115/CHEM 215/CHEM 216, MATH 226, required PHYS sequence) and 33 units of lower-division GE requirements have been satisfied. Check with a major advisor about the most appropriate course sequence. **Degree completion guaranteed in 60 units; see the Associate Degree for Transfer (ADT) section for more information** (<http://bulletin.sfsu.edu/undergraduate-admissions/transfer-students>).

Course	Title	Units
<b>First Semester</b>		
CHEM 130	General Organic Chemistry (Major Lower-Division)	3
GE Area C		3
GE Area D		3
US History ( <a href="http://bulletin.sfsu.edu/undergraduate-education/graduation-requirements/#USHaGR">bulletin.sfsu.edu/undergraduate-education/graduation-requirements/#USHaGR</a> ) or University Elective if US History met before transfer		3
University Elective		3
	Units	15
<b>Second Semester</b>		
BIOL 355	Genetics (Major Upper-Division) <sup>1</sup>	3
Physiology Course - Select One <sup>2</sup>		5-7
Physiology Lab or University Elective <sup>3</sup>		
Major Elective (4-8 units) - Take One <sup>4</sup>		3-4
GE Area UD-C: Upper-Division Arts and/or Humanities		3
	Units	15
<b>Third Semester</b>		
Cell Biology Course - Select One <sup>5</sup>		4-8
Cell Biology Lab or University Elective <sup>3</sup>		
Ecology Course - Select One <sup>6</sup>		3-4
GE Area UD-D: Upper-Division Social Sciences		3
University Elective		2
	Units	15
<b>Fourth Semester</b>		
Evolutionary or Organismal Biology Course - Select One <sup>7</sup>		3-5
Major Elective (4-8 units) - Take One <sup>3</sup>		3-4
Biology GWAR course <sup>8</sup> or University Elective if requirement already met		3
University Electives - Take Two		6
	Units	15
	Total Units	60

<sup>1</sup> Upper-Division General Education: Physical, and Life Sciences (UD-B) is satisfied upon completion of BIOL 355.

<sup>2</sup> **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)

<sup>3</sup> **Select One Laboratory Course Associated with the Physiology or Cell Biology Course Taken (Only One Laboratory Course is Required)**

- BIOL 351GW Experiments in Cell and Molecular Biology - GWAR (4 units)
- BIOL 402GW General Microbiology Laboratory - GWAR (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 - GWAR (3 units)
- BIOL 631GW Animal Physiology Laboratory - GWAR (4 units)

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

Select four to eight 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 three units of BIOL 699 can also be used towards the total of four to eight 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, SJ)  
 BIOL 337 Evolution (3 units)  
 BIOL 344GW Research Skills - GVAR (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 - GVAR (3 units)  
 BIOL 478GW Ornithology - GVAR (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 Taxonomy (5 units)  
 BIOL 525 Plant Physiology (3 units)  
 BIOL 526 Plant Molecular Physiology Laboratory (2 units)  
 BIOL 529GW Plant Ecology - GVAR (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 - GVAR (4 units)  
 BIOL 577 Ecological and Environmental Modeling (4 units)  
 BIOL 580 Limnology (3 units)  
 BIOL 582 Biological Oceanography (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)

**5 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)

**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 (4 units)  
 BIOL 585 Marine Ecology (3 units)  
 BIOL 586 Marine Ecology Laboratory (2 units)

**7 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 Taxonomy (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)

**8 The following courses fulfill the GVAR requirement:**

BIOL 344GW Research Skills - GVAR (3 units)  
 BIOL 351GW Experiments in Cell and Molecular Biology - GVAR (4 units)  
 BIOL 402GW General Microbiology Laboratory - GVAR (3 units)  
 BIOL 475GW Herpetology - GVAR (3 units)  
 BIOL 478GW Ornithology - GVAR (4 units)  
 BIOL 529GW Plant Ecology - GVAR (4 units)  
 BIOL 570GW Biology of Fishes - GVAR (4 units)  
 BIOL 613GW Human Physiology Laboratory - GVAR (3 units)  
 BIOL 631GW Animal Physiology Laboratory - GVAR (4 units)

**To Do at SF State:**

Enough total units to reach 120 minimum for graduation; 40 units minimum at the upper-division level; to include the following:

**University-Wide Requirements: 15-21 Units**

- American Institutions (0-6 units): Courses may satisfy both American Institutions and Upper-Division GE if approved for multiple areas.
- Lower-Division GE (6 units): Area C (3 units in any subarea) and Area D (3 units). D2 satisfies US History if needed; D3 satisfies US/CA Government requirement if needed).

- Upper-Division GE (9 units): Courses required for the major may double-count if approved for UD GE.
- B.A. Biology students satisfy Complementary Studies by taking courses in chemistry, physics, and mathematics that are required for the major.

### **General Biology Major: 24-33 Units**

BIOL 230/BIOL 240, MATH 226, all PHYS,  
CHEM 115/CHEM 215/CHEM 216 met in transfer.

- Lower-Division requirements (3 units): CHEM 130
- Major Upper-Division Requirements/GWAR (17-22 units)
- Major Upper-Division Electives (4-8 units)

### **University Electives: 7 or More Units**

Depends on course choices made at the community college, how transferred units are applied to the requirements above, and course choices at SF State. Some courses may meet more than one requirement, e.g. both in UD GE and the major. Upper-division electives recommended in order to meet the minimum 40-unit requirement.