

BACHELOR OF SCIENCE IN BIOLOGY: CONCENTRATION IN CELL AND MOLECULAR 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
First Semester		
Select One (Major Lower-Division):		3-4
BIOL 358	Forensic Genetics: Math Matters	
BIOL 458	Biometry	
CSC 210	Introduction to Computer Programming	
MATH 227	Calculus II	
CHEM 233	Organic Chemistry I (Major Lower-Division)	3
US History (http://bulletin.sfsu.edu/undergraduate-education/graduation-requirements/#USHaGR) or University Elective if US History met before transfer		3
GE Area C		3
University Elective		3
	Units	16
Second Semester		
BIOL 350	Cell Biology (Major Upper-Division)	3
BIOL 355	Genetics (Major Upper-Division) ¹	3
CHEM 335	Organic Chemistry II (Major Upper-Division)	3
GE Area D		3
GE Area UD-C: Upper-Division Arts and/or Humanities		3
	Units	15
Third Semester		
BIOL 351GW	Experiments in Cell and Molecular Biology - GWAR (Major Upper-Division)	4
BIOL 357	Molecular Genetics (Major Upper-Division)	3
CHEM 349	General Biochemistry (Major Upper-Division)	3
GE Area UD-D: Upper-Division Social Sciences		3
University Elective		2
	Units	15
Fourth Semester		
Major Upper-Division Electives (11 units) ²		11
University Elective		3
	Units	14
	Total Units	60

¹ BIOL 355 satisfies GE Area UD-B: Upper-Division Physical and/or Life Sciences.

² **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.

To Do at SF State:

Enough total units to reach 120 minimum for graduation; 30 units minimum at the upper-division level; to include the following:

University-Wide Requirements: 12–18 Units

- American Institutions (0-6 units): US History, US Government, CA Government. If not met in transfer, see next bullets.
- Lower-Division GE (6 units) – Area C (3 units in any subarea) and Area D (3 units). D2 courses satisfy US History; D3 courses satisfy US/CA Government requirements.
- Upper-Division GE (9 units): See Note 1. Also, courses may satisfy the US History or US/CA Government requirements, and UD-C or UD-D at the same time, if approved for multiple areas.
- Students entering this major with the AS-T in Biology are not required to fulfill SF State Studies or Complementary Studies requirements.

Biology – Cell and Molecular Biology Major: 37 Units

Completed: BIOL 230/BIOL 240, MATH 226, all PHYS, and CHEM 115/CHEM 215/CHEM 216.

- Lower-Division Requirements (7 units): CHEM 233; CSC 210 or MATH 227. BIOL 358 or BIOL 458 can be substituted for CSC 210 or MATH 227.
- Major Upper-Division Requirements/GVAR (19 units)
- Major Upper-Division Electives (11 units) – upon advisement; includes lab component. See list above.

University Electives: 5 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., UD GE and the major.