

BS IN BIOLOGICAL SCIENCE (GENERAL BIOLOGY)

Units required for Major: 73-85, includes units of study in chosen concentration (see below).

Total units required for BS: 120

Program Description

The general biology concentration is intended to give students a broad training in the Biological Sciences and an opportunity to explore a wide range of elective courses. It also provides necessary preparation for most graduate programs and selected entry level technical positions in industry and government. The BS in Biological Sciences meets the Subject Matter Competency requirement to enter a Biology Single Subject Teaching Credential Program (the Biology Subject Matter Waiver Program requires three additional geoscience and environmental studies courses) and also satisfies requirements for admission to health professional schools (with additional coursework in Math and Chemistry).

Program Requirements

Code	Title	Units
Required Lower Division Core Courses (37-41 Units)		
BIO 1	Biodiversity, Evolution and Ecology ¹	5
BIO 2	Cells, Molecules and Genes	5
CHEM 1A	General Chemistry I ¹	5
CHEM 1B	General Chemistry II	5
Select one of the following:		3 - 6
CHEM 20	Organic Chemistry Lecture–Brief Course ²	
CHEM 24 & CHEM 124	Organic Chemistry Lecture I & Organic Chemistry Lecture II	
Select one of the following:		3 - 4
MATH 26A	Calculus I for the Social and Life Sciences	
MATH 30	Calculus I	
PHYS 5A	General Physics: Mechanics, Heat, Sound	4
PHYS 5B	General Physics: Light, Electricity and Magnetism, Modern Physics	4
STAT 1	Introduction to Statistics ¹	3
Required Upper Division Core Courses (7 Units)		
BIO 100	Introduction to Scientific Analysis	3
BIO 184	General Genetics	4
Concentration (29-37 Units)		
Select from the following concentrations:		29 - 37
General Biology		
Biomedical Sciences		
Cell and Molecular Biology		
Clinical Laboratory Sciences		
Ecology, Evolution, and Conservation		
Forensic Biology		

Microbiology	
Total Units	73-85

¹ Course also satisfies General Education (GE)/Graduation Requirement.

² CHEM 24 and CHEM 124 may be taken in lieu of CHEM 20. (CHEM 124 is not counted toward the 36 upper division unit requirement in the major except in the Biomedical Sciences Concentration.)

Notes:

- Pre-Health Professional students should take the Chemistry and Math requirements as stated in the Pre-Health Professional Program section of this catalog.
- With approval, up to six units of upper division coursework from related fields may be applied as electives in the major.

Concentration in General Biology (29 units)

Code	Title	Units
Required Courses (16 Units)		
BIO 121	Molecular Cell Biology	3
BIO 139	General Microbiology	4
BIO 160	General Ecology	3
BIO 188	Evolution	3
CHEM 161	General Biochemistry ¹	3
Elective Courses (13 Units)		
Select one of the following Structure and Function electives:		3
BIO 104	Physiology of Human Reproduction	
BIO 122	Advanced Human Anatomy	
BIO 123	Neuroanatomy	
BIO 126	Comparative Vertebrate Morphology	
BIO 127	Developmental Biology	
BIO 128	Plant Anatomy and Physiology	
BIO 130	Histology	
BIO 131	Systemic Physiology	
BIO 132	Neurophysiology	
BIO 133	Cardiovascular, Respiratory and Renal Physiology	
Select additional upper division elective courses in consultation with an advisor to total 13 total upper division elective units.		10
Total Units		29

¹ CHEM 160A and CHEM 160B may be taken in lieu of CHEM 161. Only three units of the package may be counted toward the upper division requirement.

- No more than 3 units from the following combined can be applied to the Biological Sciences upper division major requirement. No more than 2 units of BIO 195 and 197 series courses can count toward the upper division major requirement.

Code	Title	Units
BIO 195	Biological Internship	1 - 2
BIO 197A	Laboratory Teaching Assistant	1 - 2

BIO 197B	Laboratory Techniques	1 - 2
BIO 197C	Co-curricular Activities in Biology	1 - 2
BIO 199A	Introductory Undergraduate Research	1 - 2
BIO 199B	Directed Readings	1 - 2

General Education Requirements ¹

Code	Title	Units
Area A: Basic Subjects (9 Units)		
A1 - Oral Communication		3
A2 - Written Communication		3
A3 - Critical Thinking		3
Area B: Physical Universe and Its Life Forms (3 Units)		
B1 - Physical Science ²		0
B2 - Life Forms ²		0
B3 - Lab (Note: Lab experience to be taken with one of the following: B1, B2 or B5) ²		0
B4 - Math Concepts ²		0
B5 - Additional Course (Any B to reach 12 units) - Take upper-division course to complete Area & upper division requirements.		3
Area C: Arts and Humanities (12 Units)		
C1 - Arts		3
C2 - Humanities		3
C1/C2 - Area C Course		3
C1/C2 - Area C Course - Take upper-division course to complete Area & upper division requirements.		3
Area D: The Individual and Society (9 Units)		
Area D Course		3
Area D Course		3
Area D Course - Take upper-division course to complete Area & upper division requirements.		3
Area E: Understanding Personal Development (3 Units)		
Area E Course		3
Area F: Ethnic Studies (3 Units)		
Area F Course		3
Total Units		39

¹ To help you complete your degree in a timely manner and not take more units than absolutely necessary, there are ways to use single courses to meet more than one requirement (overlap). For further information, please visit the General Education page (<https://catalog.csus.edu/colleges/academic-affairs/general-education/>).

Note: There is no way to list all possible overlaps so please consult with a professional advisor. The Academic Advising Center can be visited online (<http://www.csus.edu/acad/>), by phone (916) 278-1000, or email (advising@csus.edu).

² Required in Major; also satisfies GE.

Graduation Requirements ¹

Code	Title	Units
Graduation Requirements (required by CSU) (9 Units)		
American Institutions: U.S. History		3

American Institutions: U.S. Constitution & CA Government	3
Writing Intensive (WI)	3
Graduation Requirements (required by Sacramento State) (12 Units)	
English Composition II	3
Race and Ethnicity in American Society (RE)	3
Foreign Language Proficiency Requirement ²	6

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² If not satisfied before entering Sacramento State, it may be satisfied in General Education Area C2 (Humanities). "C- or better required." The alternative methods for satisfying the Foreign Language Proficiency Requirement are described here: <https://www.csus.edu/college/arts-letters/world-languages-literatures/foreign-language-requirement.html> (<https://www.csus.edu/college/arts-letters/world-languages-literatures/foreign-language-requirement.html>)

The following roadmaps are sample planning resources. Please consult your academic advisor and Academic Catalog for graduation requirements as you develop your individualized academic plan.

Biological Science (General Biology), BS: 4-Year Roadmap

Course	Title	Units
Year 1		
First Semester		
MATH 26A or MATH 30	Calculus I for the Social and Life Sciences ³ or Calculus I	3 - 4
GE Area 1C - Oral Communication ²		3
GE Area 3B - Humanities ²		3
GE Area 6 - Ethnic Studies ²		3
Elective of Choice		3
Units		15-16
Second Semester		
CHEM 1A	General Chemistry I	5
STAT 1	Introduction to Statistics	3
GE Area 1A - English Composition ²		3
GE Area 1B - Critical Thinking ²		3
Units		14
Year 2		
First Semester		
BIO 1	Biodiversity, Evolution and Ecology	5
CHEM 1B	General Chemistry II	5
GE Area 4 - Social & Behavioral Sciences ²		3
GR American Institutions (US History) ²		3
Units		16
Second Semester		
BIO 2	Cells, Molecules and Genes	5

CHEM 20 or CHEM 24 or CHEM 124	Organic Chemistry Lecture-- Brief Course ³ or Organic Chemistry Lecture I or Organic Chemistry Lecture II	3
ENGL 20	College Composition II	3
GR American Institutions (GOVT) ²		3
Units		14

Year 3**First Semester**

BIO 100	Introduction to Scientific Analysis	3
BIO 184	General Genetics	4
CHEM 161	General Biochemistry	3
GE Area 3A - Arts ²		3
Foreign Language Semester 1 ²		4
Units		17

Second Semester

BIO 121	Molecular Cell Biology	3
BIO 160	General Ecology	3
General Biology Elective ³		3
Structure and Function Elective ³		3
Foreign Language Semester 2 ²		4
Units		16

Year 4**First Semester**

BIO 139	General Microbiology	4
PHYS 5A	General Physics: Mechanics, Heat, Sound	4
General Biology Elective ³		4
Elective of Choice		3
Units		15

Second Semester

BIO 188	Evolution	3
PHYS 5B	General Physics: Light, Electricity and Magnetism, Modern Physics	4
General Biology Elective ³		3
Upper Division GE Area 3 - Arts or Humanities + Writing Intensive ²		3
Upper Division GE Area 4 - Social & Behavioral Sciences ²		3
Units		16
Total Units		123-124

Biological Science (General Biology), BS: 2-Year Roadmap

Course	Title	Units
Year 1		
First Semester		
BIO 100	Introduction to Scientific Analysis	3
BIO 184	General Genetics	4
CHEM 161	General Biochemistry	3
Foreign Language Semester 1 ²		4
Units		14
Second Semester		
BIO 121	Molecular Cell Biology	3
BIO 160	General Ecology	3
General Biology Elective ³		3
Structure and Function Elective ³		3
Foreign Language Semester 2 ²		4
Units		16

Year 2**First Semester**

BIO 139	General Microbiology	4
General Biology Elective ³		3
GR American Institutions (US History) ²		3
GR American Institutions (GOVT) ²		3
Elective of Choice		3
Units		16

Second Semester

BIO 188	Evolution	3
General Biology Elective ³		3
General Biology Elective ³		4
Upper Division GE Area 3 - Arts or Humanities + Writing Intensive ²		3
Upper Division GE Area 4 - Social & Behavioral Sciences ²		3
Units		16
Total Units		62

- ¹. Any course not completed in the first semester should be taken in the second or a later semester.
- ². Please see General Education/Graduation Requirement **course options** (https://www.csus.edu/academic-affairs/curriculum-workflow/_internal/_documents/program-road-maps/als_2yr/art_transfer-roadmap-2024-25.pdf).
- ³. Please see an academic advisor for elective options.