

# MICROBIOLOGY BS

The Bachelor of Science in Microbiology offers two options, the option in general microbiology and the option in clinical laboratory science. The general microbiology option is designed to prepare students for careers in biotechnology, environmental or industrial microbiology, pharmaceutical and biomedical research, or graduate studies. The clinical laboratory science option prepares students for an internship to become a clinical laboratory scientist or public health microbiologist.

## Student Learning Outcomes

All candidates for the BS in microbiology will demonstrate mastery in the following Student Learning Outcomes:

1. Students can demonstrate knowledge of cell structure and metabolism.
2. Students can demonstrate knowledge of evolutionary forces and their consequences.
3. Students can demonstrate knowledge as to how microorganisms interact with their environment.
4. Students can demonstrate knowledge of the interaction between humans and microorganisms.
5. Students can describe and use new and existing methods and technologies in and out of the laboratory setting.
6. Students can formally communicate the results of biological investigations using both oral and written communication skills.
7. Students can demonstrate an understanding, and ability to use, the scientific method including observation, hypotheses testing, data collection, and analysis.

## Advising Requirement

Advising is mandatory for this program. Consult your department advisor or program coordinator for information.

## E-advising Tools

Use the interactive e-advising tools designed to help students graduate within four years. These tools can be accessed through the Student Center in the Portal (<https://portal.csuchico.edu>).

## Grading Requirement

All courses taken to fulfill program course requirements must be taken for a letter grade except those courses specified by the department as credit/no credit grading only.

## Course Requirements for the Major: 78 units

Completion of the following courses, or their approved transfer equivalents, is required of all candidates for this degree. Courses in this program may complete more than one graduation requirement.

Course	Title	Units
<b>Lower Division</b>		
BIOL 109	The Biological University Experience	1
BIOL 161	Principles of Ecological, Evolutionary, and Organismal Biology	4
BIOL 162	Principles of Cellular and Molecular Biology	4

BIOL 163	Principles of Physiology and Development	4
CHEM 111	General Chemistry I	4
CHEM 112	General Chemistry II	4
CHEM 270	Organic Chemistry I	4
ENVL 105W	Environmental Literacy (W)	3
or ENVL 105	Environmental Literacy	
PHYS 202A	General Physics I	4
PHYS 202B	General Physics II	4
Select four units from the following: <sup>1</sup>		4
MATH 105	Introduction to Statistics	
& MATH 130	and Introduction to R	
MATH 109	Survey of Calculus	
MATH 120	Analytic Geometry and Calculus	
<b>Upper Division <sup>2</sup></b>		
BIOL 360	Genetics	4
BIOL 371W	Microbiology (W)	4
CHEM 370	Organic Chemistry II	3
CHEM 370L	Organic Chemistry Laboratory	1
CHEM 451	Biochemistry I	3
CHEM 453L	Biochemistry Laboratory	1
Select one of the following options:		22
Clinical Laboratory Science (p. 1)		
General Microbiology (p. 1)		
<b>Total Units</b>		<b>78</b>

<sup>1</sup> MATH 105 and MATH 130 are recommended for most students. Students who need calculus may take MATH 109 or MATH 120.

<sup>2</sup> Microbiology majors are expected to have completed BIOL 109, BIOL 161, BIOL 162, BIOL 163, CHEM 111, and CHEM 112 before beginning their upper-division requirements.

## Major Option Course Requirements

Students must select at least one of the following options for completion of the major course requirements.

### The Option in Clinical Laboratory Science: 22 units

Course	Title	Units
BIOL 462	Hematology	3
BIOL 466	Immunology	4
BIOL 470W	Medical Bacteriology (W)	5
CHEM 320	Quantitative Analysis	4
Select six units from the following:		6
BIOL 399	Special Problems <sup>1</sup>	
Any 400-level Biological Sciences (BIOL) courses.		
<b>Total Units</b>		<b>22</b>

<sup>1</sup> A maximum of three units may be applied to the major.

### The Option in General Microbiology: 22 units

Course	Title	Units
BIOL 402	Microbial Ecology	4
BIOL 412W	Bacterial Physiology (W)	4
Select 14 units from the following selections		14

Select one of the following:

CHEM 320	Quantitative Analysis
MATH 315	Applied Statistical Methods I

Select two of the following:

BIOL 466	Immunology
BIOL 470W	Medical Bacteriology (W)
BIOL 472	Microbial Genetics
BIOL 476	General Virology

Select one to four units from the following:

BIOL 399	Special Problems <sup>1</sup>
Any 400-level Biological Sciences (BIOL) courses.	

**Total Units**

**22**

<sup>1</sup> A maximum of three units may be applied to the major.

## Honors in the Major

Honors in the Major is a program of independent work in your major. It requires six units of honors coursework completed over two semesters.

The Honors in the Major program allows you to work closely with a faculty mentor in your area of interest on an original performance or research project. This year-long collaboration allows you to work in your field at a professional level and culminates in a public presentation of your work. Students sometimes take their projects beyond the University for submission in professional journals, presentation at conferences, or academic competition. Such experience is valuable for graduate school and professional life. Your honors work will be recognized at your graduation, on your permanent transcripts, and on your diploma. It is often accompanied by letters of commendation from your mentor in the department or the department chair.

Some common features of Honors in the Major program are:

- You must take six units of Honors in the Major coursework. All six units are honors courses (marked by a suffix of H), and at least three of these units are independent study (399H, 499H, 599H) as specified by your department. You must complete each course with a minimum grade of B.
- You must have completed 9 units of upper-division coursework or 21 overall units in your major before you can be admitted to Honors in the Major. Check the requirements for your major carefully, as there may be specific courses that must be included in these units.
- Your cumulative GPA should be at least 3.5 or within the top 5% of majors in your department.
- Your GPA in your major should be at least 3.5 or within the top 5% of majors in your department.
- Most students apply for or are invited to participate in Honors in the Major during the second semester of their junior year. Then they complete the six units of coursework over the two semesters of their senior year.
- Your honors work culminates with a public presentation of your honors project.

Honors in the Major is not part of the Honors Program. Each department administers its own program. Please contact your major department or major advisor to apply.

See Bachelor's Degree Requirements (<https://catalog.csuchico.edu/undergraduate-requirements/bachelors-degree-requirements/>) for complete details on general degree requirements. A minimum of 39 units, including those required for the major, must be upper division.

## General Education Requirements: 43 units

See General Education (<https://catalog.csuchico.edu/colleges-departments/undergraduate-education-academic-success/general-education/#gerequirementstext>) and the Class Schedule (<http://www.csuchico.edu/schedule/>) for the most current information on General Education requirements and course offerings.

This major has approved GE modification(s). See below for information on how to apply these modification(s).

- BIOL 360 is an approved major course substitution for Upper Division Physical and Biological Sciences (UD-5).

## American Institutions Course Requirements: 6 units

The American Institutions graduation requirement, as mandated in Title 5, Section 40404 (<https://govt.westlaw.com/calregs/Document/I56C041434C6911EC93A8000D3A7C4BC3/?viewType=FullText&originationContext=documenttoc&transitionType=CategoryPage>) requires that students satisfactorily complete courses in United States history, the US Constitution, and government and American ideals (including California state and local government). At Chico State, HIST 130 meets the US history requirement (US-1), and POLS 155 meets the US Constitution and government requirement (US-2) and the California state and local government requirement (US-3). POLS 155 also fulfills three units of GE Area 4, Social and Behavioral Sciences. See Bachelor's Degree Requirements (<https://catalog.csuchico.edu/undergraduate-requirements/bachelors-degree-requirements/#amin>) for more information.

## Diversity Course Requirements: 6 units

You must complete a minimum of two courses that focus primarily on cultural diversity. At least one course must be in US Diversity (USD) and at least one in Global Cultures (GC). See Diversity Requirements (<https://catalog.csuchico.edu/undergraduate-requirements/diversity-requirements/>) for a full list of courses. Many courses taken to satisfy these requirements may also apply to General Education (<https://catalog.csuchico.edu/colleges-departments/undergraduate-education-academic-success/general-education/>).

## Upper-Division Writing Requirement

Writing Across the Curriculum (EM 17-009 (<https://www.csuchico.edu/pres/em/2017/17-009.shtml/>)) is a graduation requirement and may be demonstrated through satisfactory completion of four Writing (W) courses, two of which are designated by the major department. See Writing and Math Requirements (<https://catalog.csuchico.edu/undergraduate-requirements/writing-math-requirements/>) for more details on the four courses. The first of the major designated Writing (W) courses is listed below.

- BIOL 371W Microbiology (W)

The second major-designated Writing course is the Graduation Writing Assessment Requirement (GW) (EO 665 (<https://calstate.policystat.edu/policy/9585618/latest/>)). Students must earn a C- or higher to receive GW

credit. The GE English Composition (1A) (<https://catalog.csuchico.edu/colleges-departments/undergraduate-education-academic-success/general-education/#1A>) requirement must be completed before a student is permitted to register for a GW course.