Program
BS in Biological Sciences
BS in Microbiology
Option in:
  General Microbiology
  Clinical Laboratory Science
Minor in Biological Sciences
Pre-Professional Programs:
  Dentistry
  Forestry
  Medicine
  Physical Therapy
  Veterinary Medicine
Single Subject Teaching
CREDENTIAL IN SCIENCE WITH A
CONCENTRATION IN BIOLOGICAL SCIENCE
MS in Biological Sciences
MS in Botany
The Department of Biological Sciences seeks to introduce our students to a scientific understanding of the many forms of life and their ecological interactions and to equip our students with the scientific knowledge and perspective to participate in today's world as well-informed and biologically literate citizens.

We intend further to expose our majors to current research and techniques in biological sciences and prepare them for employment opportunities, graduate education, or professional programs of study such as medicine and dentistry. Biology majors can create a course of study that will allow them to concentrate in ecology, zoology, botany, physiology, or cell/molecular biology. Microbiology majors can choose a General Microbiology Option or the Clinical Laboratory Science Option. In addition, they can select courses which will prepare them for a career in biotechnology. The close proximity to many natural research sites enhances field courses and provides research opportunities for both field and laboratory work.

Faculty and Facilities
The faculty represent diverse academic backgrounds. All are vitally interested in their students. Faculty members, in addition to teaching and advising are actively involved in research and scientific publication. The department encourages undergraduates to be involved in faculty research programs. In addition to excellent field sites, the department has many well-equipped teaching and research areas, such as labs for aquatic ecology, molecular biology and biotechnology, electron microscopy, microbiology, and cell physiology. A natural history museum, herbarium, and greenhouses are also available.

Graduate Programs
The objectives of the graduate program are to develop research and analytical skills so that students are equipped to conduct independent research and teach as professional biologists upon graduation. Faculty interests offer graduate students a wide range of areas in which to do research. The MS in Biology and in Botany combines coursework and satisfactory completion of original research, presented in a thesis.

Eagle Lake
The College of Natural Sciences, in conjunction with the University of California, Davis, operates the Biological Field Station on Eagle Lake, about forty kilometers northwest of Susanville, California. Summer coursework and year-round research opportunities are available to undergraduates and graduate students.

Experiences
Students are involved in faculty research projects in the laboratory, field, and library. Internships are available with a number of agencies including the National Institutes of Health, the California Department of Fish and Game, United States Forest Service, and many biotechnology firms. Additional listings and information are available from the department office.

Career Outlook
The organizational, data-gathering, and written communication skills acquired by biology majors prepare students for a wide variety of careers. Students may prepare themselves for employment in laboratories, business, or teaching. Laboratory technician or research associate positions are available in university and governmental research centers, pharmaceutical and biological product manufacturers, biotechnology, genetic engineering, and agricultural and food processing companies.

Students who emphasize field studies may prepare themselves for positions in private companies as well as state and federal agencies. Some of these positions include wildlife biologist, aquatic and restoration ecologist, and horticulturist. Participation in volunteer or paid internships or cooperative education programs while an undergraduate enhances employability in these areas.
THE BACHELOR OF SCIENCE IN BIOLOGICAL SCIENCES

Total Course Requirements for the Bachelor’s Degree: 120 units

See “Requirements for the Bachelor’s Degree” in The University Catalog for complete details on general degree requirements. A minimum of 40 units, including those required for the major, must be upper division.

The department has prepared a suggested Four Year Advising Plan to help students meet all graduation requirements within four years. Please request a plan from your major adviser or view it and other current advising information on the CSU, Chico Web.

General Education Requirements: 48 units

See “General Education Requirements” in The University Catalog and The Class Schedule for the most current information on General Education Requirements and course offerings. The course requirements marked below with an asterisk (*) may also be applied toward General Education.

Biological Sciences majors may meet the Breadth Area B2 requirement by completing BIOL 006A.

Cultural Diversity Course Requirements: 6 units

See “Cultural Diversity” in The University Catalog. Most courses used to satisfy these requirements may also apply to General Education.

American Institutions Requirement: 6 units

See the “American Institutions Requirement” under “Bachelor’s Degree Requirements.” This requirement is normally fulfilled by completing HIST 050 and POLS 050. Courses used to satisfy this requirement do not apply to General Education.

Literacy Requirement:

See “Mathematics and Writing Requirements” in The University Catalog. Writing proficiency in the major is a graduation requirement and may be demonstrated through satisfactory completion of a course in your major which has been designated as the Writing Proficiency (WP) course for the semester in which you take the course. Students who earn below a C- are required to repeat the course and earn a C- or better to receive WP credit. See The Class Schedule for the designated WP courses for each semester. You must pass ENGL 001 (or its equivalent) with a C- or better before you may register for a WP course.

Course Requirements for the Major: 63 units

The following courses, or their approved transfer equivalents, are required of all candidates for this degree. Additional required courses, dependent upon a selected option or advising pattern, are outlined following the degree core program requirements.

Lower-Division Requirements: 31-32 units

2 courses required:
BIOL 006A Biological Principles 4.0 FS
Prerequisites: Recommend CHEM 037 or concurrent enrollment.
BIOL 006B Biological Principles 4.0 FS
Prerequisites: BIOL 006A; recommend CHEM 038 or concurrent enrollment.

1 course selected from:
BIOL 009 General Botany 3.0 FS
Prerequisites: BIOL 006B or faculty permission.
BIOL 010 General Zoology 3.0 FS
Prerequisites: BIOL 006B or faculty permission.
BIOL 011 General Microbiology 4.0 FS
Prerequisites: A college course in biology and in general chemistry.

NOTE: If BIOL 011 is chosen, the number of upper-division elective units required will be reduced by one unit.

5 courses required:
CHEM 037 General Chemistry 4.0 FS*  
Prerequisites: Second-year high school algebra; one year high school chemistry or CHEM 016. (One year of high school physics and one year of high school mathematics past Algebra II are recommended.)
CHEM 038 General Chemistry 4.0 FS  
Prerequisites: CHEM 037.
CHEM 070 Organic Chemistry 4.0 FS  
Prerequisites: CHEM 038.
PHYS 002A General Physics 4.0 FS*  
Prerequisites: High school physics or faculty permission. High school trigonometry and second-year high school algebra or equivalent (MATH 003 and MATH 004 at CSU, Chico).
PHYS 002B General Physics 4.0 FS  
Prerequisites: PHYS 002A.

Upper-Division Requirements: 31-32 units

Biological sciences majors are expected to have completed BIOL 006A, BIOL 006B, and CHEM 038 before beginning their upper-division requirements.

Upper-Division Core: 15-16 units

4 courses required:
BIOL 201 Intro to Biological Literature 1.0 FS  
Prerequisites: ENGL 001 (or its equivalent) with a grade of C- or higher; junior standing; BIOL 006B.
BIOL 207 Genetics 4.0 FS  
Prerequisites: BIOL 006B.
BIOL 258 Fundamentals of Ecology 4.0 FS  
Prerequisites: BIOL 006B. Some taxonomic background is recommended.
CHEM 170 Organic Chemistry 3.0 FS  
Prerequisites: CHEM 070.

Physiology requirement:

1 course selected from:
BIOL 206 Cell Physiology 3.0 SP  
Prerequisites: BIOL 006B; CHEM 028 or CHEM 070.
BIOL 214 Vertebrate Physiology 4.0 FS  
Prerequisites: BIOL 006B, BIOL 010; CHEM 028 or CHEM 070.
BIOL 215 Plant Physiology 4.0 FS  
Prerequisites: BIOL 006B or BIOL 008; BIOL 009; CHEM 028 or CHEM 070; or faculty permission.
BIOL 272 Bacterial Physiology 4.0 SP  
Prerequisites: BIOL 011; BIOL 207; CHEM 070. CHEM 250A is required.

Upper-Division Electives: 15-17 units

15-17 units selected from:

Any 200-level biology (BIOL) courses.
Select courses in addition to the Upper-Division Core requirement to complete the minimum required number of 63 units total for the major. A maximum of 3 units of BIOL 199 may be taken in one semester, and a maximum of 3 units of BIOL 199, BIOL 289, or BIOL 299H may be credited toward the major.

NOTE: With your adviser’s approval, you may substitute one of BIOL 009, BIOL 010, or BIOL 011 for a 200-level course if it has not been used to meet the lower-division requirements. In addition, the following courses are acceptable substitutes for 200-level biology courses.

BIOL 123 Microtechnique 2.0 Inq  
Prerequisites: BIOL 006B.
BIOL 152 Computer Applications Biology 3.0 SP  
Prerequisites: BIOL 006B and a computer science course providing skills in programming. Recommended: MATH 007A or a statistics course.
BIOL 199 Special Problems 1.0-3.0 FS  
Prerequisites: CHEM 170L Organic Chem Laboratory 1.0 FS  
CHEM 170L Organic Chem Laboratory 1.0 FS  
Prerequisites: CHEM 170 may be taken as a prerequisite or concurrently with CHEM 170.
CHEM 250A Biochemistry 3.0 FS  
Prerequisites: CHEM 170.

In selecting courses to meet the 15-17 unit elective requirement, you should consult with your adviser to create a package of elective courses that will best meet your career goals. You could select groups of courses that will allow you to concentrate in a given area such as cell/molecular biology, ecology, botany, zoology, or select courses that will meet requirements for a teaching credential, graduate or professional school, or a specific occupation.

Electives Requirement:

To complete the total units required for the bachelor’s degree, select additional elective courses from the total university offerings. You should consult with an advisor regarding the selection of courses which will provide breadth to your university experience and apply to a supportive second major or minor.

Grading Requirement:

All courses taken to fulfill major course requirements must be taken for a letter grade, except those courses specified by the department as Credit/No Credit grading only.

Advising Requirement:

Advising is mandatory for all majors in this degree program. Consult your undergraduate adviser for specific information.
Honors in the Major

Honors in the Major is a program of independent work in your major. It involves 6 units of honors course work completed over two semesters. 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. Most importantly, however, 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 competition in shows; such experience is valuable for graduate school and later professional life.

Some common features of Honors in the Major program are:
1. You must take 6 units of Honors in the Major course work. At least 3 of these 6 units are independent study (299H) as specified by your department. You must complete each class with a minimum grade of B.
2. You must have completed 9 units of upper-division course work or 21 overall units in your major before you can be admitted to Honors in the Major. Check the requirements carefully, as there may be specific courses that must be included in these units.
3. Your cumulative GPA should be at least 3.5 or within the top 5 percent of majors in your department.
4. Your GPA in your major should be at least 3.5 or within the top 5 percent of majors in your department.
5. 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 6 units of course work over the two semesters of their senior year.
6. Your honors work culminates with a public presentation of your Honors project.

While Honors in the Major is part of the Honors Program, each department administers its own program. Please contact your major department or major adviser for further information.

THE BACHELOR OF SCIENCE IN MICROBIOLOGY

Total Course Requirements for the Bachelor’s Degree: 120 units

See “Requirements for the Bachelor’s Degree” in The University Catalog for complete details on general degree requirements. A minimum of 40 units, including those required for the major, must be upper division.

The department has prepared a suggested Four Year Advising Plan to help students meet all graduation requirements within four years. Please request a plan from your major adviser or view it and other current advising information on the CSU, Chico Web.

Please see the General Education, Cultural Diversity, and U.S. Government requirements outlined under the BS in Biological Sciences.

For microbiology majors, the following courses are to be double-counted toward General Education and a microbiology major: Breadth Area B2 requirement may be fulfilled by BIOL 006A, BIOL 006B, BIOL 009, or BIOL 010. Majors may count either HIST 050 or POLS 055 for a Breadth Area C requirement (3 units maximum).

Literacy Requirement:

See “Mathematics and Writing Requirements” in The University Catalog. Writing proficiency in the major is a graduation requirement and may be demonstrated through satisfactory completion of a course in your major which has been designated as Writing Proficiency (WP) course for the semester in which you take the course. Students who earn below a C- are required to repeat the course and earn a C- or better to receive WP credit. See The Class Schedule for the designated WP courses for each semester. You must pass ENGL 001 (or its equivalent) with a C- or better before you may register for a WP course.

Course Requirements for the Major: 68-70 units

The following courses, or approved transfer equivalents, are required of all candidates for this degree. Additional required courses, dependent upon a selected option or advising pattern, are outlined following the degree core program requirements.

Lower-Division Requirements: 32 units

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<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
<th>Notes</th>
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<tbody>
<tr>
<td>BIOL 006A</td>
<td>Biological Principles</td>
<td>4.0</td>
<td>FS</td>
</tr>
<tr>
<td>BIOL 006B</td>
<td>Biophysical Principles</td>
<td>4.0</td>
<td>FS</td>
</tr>
<tr>
<td>CHEM 037</td>
<td>General Chemistry</td>
<td>4.0</td>
<td>FS</td>
</tr>
<tr>
<td>CHEM 038</td>
<td>General Chemistry</td>
<td>4.0</td>
<td>FS</td>
</tr>
<tr>
<td>CHEM 070</td>
<td>Organic Chemistry</td>
<td>4.0</td>
<td>FS</td>
</tr>
<tr>
<td>PHYS 002A</td>
<td>General Physics</td>
<td>4.0</td>
<td>FS</td>
</tr>
</tbody>
</table>

Major Option Course Requirements: 36-38 units

The following courses, or their approved transfer equivalents, are required dependent upon the option chosen. Students must select one of the following options for completion of the major course requirements.

THE OPTION IN GENERAL MICROBIOLOGY: 36-38 units

<table>
<thead>
<tr>
<th>Course</th>
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<tr>
<td>BIOL 201</td>
<td>Intro to Biological Literature</td>
<td>1.0</td>
<td>FS</td>
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<tr>
<td>BIOL 207</td>
<td>Genetics</td>
<td>4.0</td>
<td>FS</td>
</tr>
<tr>
<td>BIOL 216</td>
<td>Medical Bacteriology</td>
<td>5.0</td>
<td>FA</td>
</tr>
<tr>
<td>BIOL 270</td>
<td>Immunology</td>
<td>4.0</td>
<td>SP</td>
</tr>
<tr>
<td>BIOL 272</td>
<td>Bacterial Physiology</td>
<td>4.0</td>
<td>SP</td>
</tr>
<tr>
<td>CHEM 170</td>
<td>Organic Chemistry</td>
<td>3.0</td>
<td>FS</td>
</tr>
<tr>
<td>CHEM 170L</td>
<td>Organic Chem Laboratory</td>
<td>1.0</td>
<td>FS</td>
</tr>
<tr>
<td>CHEM 250A</td>
<td>Biochemistry</td>
<td>3.0</td>
<td>FS</td>
</tr>
<tr>
<td>CHEM 251</td>
<td>Biochemistry Laboratory</td>
<td>2.0</td>
<td>FS</td>
</tr>
<tr>
<td>BIOL 207</td>
<td>Genetics</td>
<td>4.0</td>
<td>FS</td>
</tr>
<tr>
<td>BIOL 219</td>
<td>Food and Industrial Microbiology</td>
<td>3.0</td>
<td>SP</td>
</tr>
<tr>
<td>BIOL 273</td>
<td>Microbial Genetics</td>
<td>4.0</td>
<td>FA</td>
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</table>

2-3 units selected from:

<table>
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<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
<th>Notes</th>
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<tbody>
<tr>
<td>BIOL 123</td>
<td>Microtechnique</td>
<td>2.0</td>
<td>Inq</td>
</tr>
<tr>
<td>BIOL 152</td>
<td>Computer Applications Biology</td>
<td>3.0</td>
<td>SP</td>
</tr>
<tr>
<td>BIOL 199</td>
<td>Special Problems</td>
<td>1.0-3.0</td>
<td>FS</td>
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</table>

Or any 200-level biology course.

THE OPTION IN CLINICAL LABORATORY SCIENCE: 37-38 units

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<th>Course</th>
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<th>Units</th>
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<tbody>
<tr>
<td>BIOL 201</td>
<td>Intro to Biological Literature</td>
<td>1.0</td>
<td>FS</td>
</tr>
<tr>
<td>BIOL 208</td>
<td>Hematology</td>
<td>3.0</td>
<td>S1</td>
</tr>
<tr>
<td>BIOL 212</td>
<td>Parasitology</td>
<td>4.0</td>
<td>S1</td>
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</table>

2-3 units selected from:

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<tr>
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<th>Units</th>
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</thead>
<tbody>
<tr>
<td>BIOL 152</td>
<td>Computer Applications Biology</td>
<td>3.0</td>
<td>SP</td>
</tr>
<tr>
<td>BIOL 199</td>
<td>Special Problems</td>
<td>1.0-3.0</td>
<td>FS</td>
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</tbody>
</table>
Biology Sciences

BIOL 214 Vertebrate Physiology 4.0 FS
Prerequisites: BIO L 006B, BIO L 010, CHEM 028 or CHEM 070.

BIO L 216 Medical Bacteriology 5.0 FA
Prerequisites: BIO L 011, BIO L 270; CHEM 070. Immunization against tetanus and diphtheria required.

BIO L 270 Immunology 4.0 SP
Prerequisites: BIO L 006B.

5 courses required:
CHEM 105 Quantitative Analysis 4.0 FS
Prerequisites: CHEM 036.

CHEM 170 Organic Chemistry 3.0 FS
Prerequisites: CHEM 070.

CHEM 170L Organic Chem Laboratory 1.0 FS
Prerequisites: CHEM 170 may be taken as a prerequisite or concurrently with CHEM 170L.

CHEM 250A Biochemistry 3.0 FS
Prerequisites: CHEM 170.

CHEM 252 Clinical Chemistry 3.0 SP
Prerequisites: CHEM 105, CHEM 250A, CHEM 170L or CHEM 170M.

2-3 units selected from:
BIO L 123 Microtechnique 2.0 Inq
Prerequisites: BIO L 006B.

BIO L 152 Computer Applications Biology 3.0 SP
Prerequisites: BIO L 006B and a computer science course providing skills in programming. Recommended: MATH 007A or a statistics course.

BIO L 199 Special Problems 1.0-3.0 FS
Prerequisites: BIO L 006B.

Or any 200-level biology (BIO L) course.

Please see the Grading, Literacy, and Advising Requirements outlined under the BS in Biological Sciences above.

THE MINOR IN BIOLOGICAL SCIENCES

Course Requirements for the Minor: 21 units
The following courses, or their approved transfer equivalents, are required of all candidates for this minor.

2 courses required:
BIO L 006A Biological Principles 4.0 FS
Prerequisites: CHEM 037 or concurrent enrollment.

BIO L 006B Biological Principles 4.0 FS
Prerequisites: BIO L 006A; recommend CHEM 038 or concurrent enrollment.

1 course selected from:
BIO L 009 General Botany 3.0 FS
Prerequisites: BIO L 006B or faculty permission.

BIO L 010 General Zoology 3.0 FS
Prerequisites: BIO L 006B or faculty permission.

BIO L 011 General Microbiology 4.0 FS
Prerequisites: A college course in biology and in general chemistry.

9-10 units selected from:
Any upper-division biology courses, with no more than 1 unit of BIO L 199 to bring the total for the minor to 21 units.

Written Notice
Departmental approval is required before you begin course work for this minor. Approval can be obtained by providing written notice of your intention to declare this minor to the department office.

PRE-PROFESSIONAL PROGRAMS
The following pre-professional programs are offered by the Department of Biological Sciences.

Pre-Dentistry
While dental schools do not require a degree in biology, over 90 percent of students accepted into dental schools have four years of undergraduate education or more, and over 65 percent have majors in some area of the biological sciences. It is usual for pre-dental students to complete a bachelor’s degree in biological sciences while broadly educating themselves in non-scientific subjects. Other scientific majors are also possible (see chemistry). The most important part of the pre-dentistry program is a solid general education. Dental schools select highly motivated students who have shown evidence of above-average accomplishments in a rigorous academic program. During each semester your program of courses outside the sciences should reflect this commitment to becoming well-educated.

The courses listed here meet the minimum requirements of most dental schools. It is not realistic, however, to expect to be accepted into a dental school with just the minimum course requirements.

Lower-Division
BIO L 006A Biological Principles 4.0 FS
Prerequisites: CHEM 037 or concurrent enrollment.

BIO L 006B Biological Principles 4.0 FS
Prerequisites: BIO L 006A; recommend CHEM 038 or concurrent enrollment.

BIO L 010 General Zoology 3.0 FS
Prerequisites: BIO L 006B or faculty permission.

CHEM 037 General Chemistry 4.0 FS
Prerequisites: Second-year high school algebra; one year high school chemistry or CHEM 016. (One year of high school physics and one year of high school mathematics past Algebra II are recommended.)

CHEM 038 General Chemistry 4.0 FS
Prerequisites: CHEM 037.

CHEM 070 Organic Chemistry 4.0 FS
Prerequisites: CHEM 038.

PHYS 002A General Physics 4.0 FS
Prerequisites: High school physics or faculty permission. High school trigonometry and second-year high school algebra or equivalent (MATH 003 and MATH 004 at CSU, Chico).

PHYS 002B General Physics 4.0 FS
Prerequisites: PHYS 002A.

Recommended courses:
MATH 007A Analytic Geometry and Calculus 4.0 FS
Prerequisites: Completion of ELM requirement; both MATH 004 and MATH 006 (or high school equivalent); a score that meets department guidelines on a department administered calculus readiness exam.

PSY 001A Principles of Psych 3.0 FS

Upper-Division
BIO L 010 Comparative Anatomy: Vertebrates 4.0 FA
Prerequisites: BIO L 006B, BIO L 010.

BIO L 017 Genetics 4.0 FS
Prerequisites: BIO L 006B.

BIO L 214 Vertebrate Physiology 4.0 FS
Prerequisites: BIO L 006B, BIO L 010; CHEM 028 or CHEM 070.

Recommended Courses:
BIO L 202 Cell and Molecular Biology 4.0 FA
Prerequisites: BIO L 006B.

CHEM 250A Biochemistry 3.0 FS
Prerequisites: CHEM 170.

Any upper-division Psychology course.
While acceptance rates into dental schools vary from year to year, CSU, Chico has a high rate of acceptance.
Pre-Medical
Although a BS in biological sciences is not absolutely essential for admission to medical schools, the majority of students admitted to those schools that require their admissions statistics have degrees in the biological sciences. Exotic majors often represent second majors of applicants who also have a biological sciences major. Degrees in other science majors are possible (see chemistry for an alternative program). While students may apply for admission to medical school any time after their junior year, the majority of those admitted have completed a four-year degree, and a sizable number are admitted only after additional graduate work. The education recommended, therefore, is also appropriate for those seeking advanced training in graduate schools or employment in fields related to medicine.

The following list of courses can be used to attain a BS degree in biological sciences, with emphasis on fulfilling pre-medical requirements.

**Lower-Division:**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Units</th>
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<tr>
<td>BIOL 006A</td>
<td>Biological Principles</td>
<td>4.0</td>
<td>FS</td>
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<tr>
<td>Prerequisites:</td>
<td>Recommend CHEM 037 or concurrent enrollment.</td>
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<tr>
<td>BIOL 010</td>
<td>General Zoology</td>
<td>3.0</td>
<td>FS</td>
</tr>
<tr>
<td>Prerequisites:</td>
<td>BIOL 006B or faculty permission.</td>
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<tr>
<td>CHEM 037</td>
<td>General Chemistry</td>
<td>4.0</td>
<td>FS *</td>
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<tr>
<td>Prerequisites:</td>
<td>Second-year high school algebra; one year high school chemistry or CHEM 016. (One year of high school physics and one year of high school mathematics past Algebra II are recommended.)</td>
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<td>CHEM 038</td>
<td>General Chemistry</td>
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<tr>
<td>Prerequisites:</td>
<td>CHEM 037.</td>
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<tr>
<td>CHEM 070</td>
<td>Organic Chemistry</td>
<td>4.0</td>
<td>FS</td>
</tr>
<tr>
<td>Prerequisites:</td>
<td>CHEM 038.</td>
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<tr>
<td>MATH 007A</td>
<td>Analytic Geometry and Calculus</td>
<td>4.0</td>
<td>FS *</td>
</tr>
<tr>
<td>Prerequisites:</td>
<td>Completion of ELM requirement; both MATH 004 and MATH 006 (or high school equivalent); a score that meets department guidelines on a department administered calculus readiness exam.</td>
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</tr>
<tr>
<td>PHYS 002A</td>
<td>General Physics</td>
<td>4.0</td>
<td>FS *</td>
</tr>
<tr>
<td>Prerequisites:</td>
<td>High school physics or faculty permission. High school trigonometry and second-year high school algebra or equivalent (MATH 003 and MATH 004 at CSU, Chico).</td>
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<tr>
<td>PHYS 002B</td>
<td>General Physics</td>
<td>4.0</td>
<td>FS</td>
</tr>
<tr>
<td>Prerequisites:</td>
<td>PHYS 002A.</td>
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**Upper-Division:**

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<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Units</th>
<th>Notes</th>
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</thead>
<tbody>
<tr>
<td>BIOL 201</td>
<td>Intro to Biological Literature</td>
<td>1.0</td>
<td>FS</td>
</tr>
<tr>
<td>Prerequisites:</td>
<td>ENGL 001 (or its equivalent) with a grade of C- or higher; junior standing: BIOL 006B.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOL 206</td>
<td>Genetics</td>
<td>4.0</td>
<td>FS</td>
</tr>
<tr>
<td>Prerequisites:</td>
<td>BIOL 006B.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOL 258</td>
<td>Fundamentals of Ecology</td>
<td>4.0</td>
<td>FS</td>
</tr>
<tr>
<td>Prerequisites:</td>
<td>BIOL 006B. Some taxonomic background is recommended.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHEM 170</td>
<td>Organic Chemistry</td>
<td>3.0</td>
<td>FS</td>
</tr>
<tr>
<td>Prerequisites:</td>
<td>CHEM 070.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHEM 170L</td>
<td>Organic Chem Laboratory</td>
<td>1.0</td>
<td>FS</td>
</tr>
<tr>
<td>Prerequisites:</td>
<td>CHEM 170 may be taken as a prerequisite or concurrently with CHEM 170L.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Additional courses recommended to complete the pre-medical requirement include:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Units</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 205</td>
<td>Comparative Anatomy: Vertebrates</td>
<td>4.0</td>
<td>FA</td>
</tr>
<tr>
<td>Prerequisites:</td>
<td>BIOL 006B, BIOL 010.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOL 214</td>
<td>Vertebrate Physiology</td>
<td>4.0</td>
<td>FS</td>
</tr>
<tr>
<td>Prerequisites:</td>
<td>BIOL 006B, BIOL 010, CHEM 028 or CHEM 070.</td>
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<td></td>
</tr>
<tr>
<td>BIOL 220</td>
<td>Embryology</td>
<td>4.0</td>
<td>SP</td>
</tr>
<tr>
<td>Prerequisites:</td>
<td>BIOL 006; BIOL 010 or faculty permission.</td>
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</tr>
</tbody>
</table>

While acceptance rates into medical schools vary from year to year, CSU, Chico has a high rate of acceptance.

Pre-Forestry and Pre-Physical Therapy

The requirements of schools offering programs in Forestry and Physical Therapy vary widely. Pre-Forestry and Pre-Physical Therapy students should consult the Department of Biological Sciences for the names of the faculty advisers in their program of interest.

Pre-Veterinary Medicine

Admission to a veterinary college is highly competitive. Academic performance and non-academic factors, such as appropriate work experience, are a major part of the selection criteria. Pre-veterinary medicine students should consult with the pre-veterinary adviser each semester. The following courses prepare the student to meet the minimum course requirements for admission to the School of Veterinary Medicine, University of California, Davis.

**Lower-Division**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Units</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 006A</td>
<td>Biological Principles</td>
<td>4.0</td>
<td>FS</td>
</tr>
<tr>
<td>Prerequisites:</td>
<td>Recommend CHEM 037 or concurrent enrollment.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOL 006B</td>
<td>Biological Principles</td>
<td>4.0</td>
<td>FS</td>
</tr>
<tr>
<td>Prerequisites:</td>
<td>BIOL 006A; recommend CHEM 038 or concurrent enrollment.</td>
<td></td>
<td></td>
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<tr>
<td>OR (the following course may be substituted for the above)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOL 010</td>
<td>General Zoology</td>
<td>3.0</td>
<td>FS</td>
</tr>
<tr>
<td>Prerequisites:</td>
<td>BIOL 006B or faculty permission.</td>
<td></td>
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</tr>
</tbody>
</table>

**BIOL 037** General Chemistry

Prerequisites: Second-year high school algebra; one year high school chemistry or CHEM 016. (One year of high school physics and one year of high school mathematics past Algebra II are recommended.)

**CHEM 038** General Chemistry

Prerequisites: CHEM 037.

**CHEM 070** Organic Chemistry

Prerequisites: CHEM 038.

**CMST 011** Speech Comm Fundamentals

3.0 FS *

**CMST 012** Small Group Communication

3.0 FS *

**ENGL 001** Freshman Composition

3.0 FS *

**MATH 005** Statistics

3.0 FS *

**MATH 215** may be substituted for MATH 005.

**PHYS 002A** General Physics

4.0 FS *

**PHYS 002B** General Physics

4.0 FS

**Upper-Division**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Units</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 207</td>
<td>Genetics</td>
<td>4.0</td>
<td>FS</td>
</tr>
<tr>
<td>Prerequisites:</td>
<td>BIOL 006B.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOL 214</td>
<td>Vertebrate Physiology</td>
<td>4.0</td>
<td>FS</td>
</tr>
<tr>
<td>Prerequisites:</td>
<td>BIOL 006B, BIOL 010, CHEM 028 or CHEM 070.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOL 220</td>
<td>Embryology</td>
<td>4.0</td>
<td>SP</td>
</tr>
<tr>
<td>Prerequisites:</td>
<td>BIOL 006B, BIOL 010 or faculty permission.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHEM 170</td>
<td>Organic Chemistry</td>
<td>3.0</td>
<td>FS</td>
</tr>
<tr>
<td>Prerequisites:</td>
<td>CHEM 070.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHEM 250A</td>
<td>Biochemistry</td>
<td>3.0</td>
<td>FS</td>
</tr>
<tr>
<td>Prerequisites:</td>
<td>CHEM 170.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH 215</td>
<td>Biometrics</td>
<td>3.0</td>
<td>FA</td>
</tr>
<tr>
<td>Prerequisites:</td>
<td>Completion of ELM requirement.</td>
<td></td>
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</tr>
</tbody>
</table>

MATH 005 may be substituted for MATH 215. Elective courses in social sciences or humanities for a minimum of 8 units.

**The Single Subject Teaching Credential in Science with a Concentration in Biological Science**

Course Requirements for the Single Subject Teaching Credential: 69 units

In most majors, candidates for this credential will normally fulfill the single subject matter preparation program by completing the appropriate education option in the major. Any exceptions to this procedure are noted at the end of this section. In addition to the single subject matter preparation program, completion of an additional professional education program is required to qualify for a California teaching credential. Professional education (credential) programs are available through the School of Education. For prerequisites and other admission requirements to professional education programs, see the “Education” chapter of this catalog. All credential candidates recommended by CSU, Chico (under the SB 2042 standards) are authorized to teach all students including English learners in the regular classroom. You may also want to consider qualifying for BCLAD (Bilingual, Cross-cultural, Language, and Academic Development) emphasis and supplementary authorizations in additional subject matter areas as you plan your program.

Your departmental credential adviser is responsible for verifying that the subject matter preparation program has been completed. If you are interested in obtaining a teaching credential, confer with the appropriate credential adviser early in your university career. Department credential advisers can assist you in planning an educational program that meets both major and credential requirements.

Subject matter preparation requirements are governed by legislative action and approval of the California Commission on Teacher Credentialing. Requirements may change between catalogs. Please consult with your departmental credential adviser for current information.
The following courses, or their approved transfer equivalents, are required of all candidates for this credential.

**Single Subject Matter Preparation in Science: 69 units**

**Breadth: 30 units**

- **8 courses required:**
  - BIOL 006A Biological Principles 4.0 FS
    - Prerequisites: Recommend CHEM 037 or concurrent enrollment.
  - BIOL 006B Biological Principles 4.0 FS
    - Prerequisites: Recommend CHEM 038 or concurrent enrollment.
  - CHEM 037 General Chemistry 4.0 FS
    - Prerequisites: Second-year high school algebra; one year high school chemistry or CHEM 016. (One year of high school physics and one year of high school mathematics past Algebra II are recommended.)
  - CHEM 038 General Chemistry 4.0 FS
    - Prerequisites: CHEM 037.
  - GEOG 002 Physical Geology 3.0 FS *
    - Prerequisites: High school chemistry or physics is recommended; students with no previous science courses are advised to enroll in GEOG 001. No college credit for those who have passed GEOG 001.
  - GEOG 132 Concepts in Earth/Space Science 3.0 FS
    - Prerequisites: GEOG 041 or faculty permission.
  - PHYS 002A General Physics 4.0 FS *
    - Prerequisites: High school physics or faculty permission. High school trigonometry and second-year high school algebra or equivalent (MATH 003 and MATH 004 at CSU, Chico).
  - PHYS 002B General Physics 4.0 FS
    - Prerequisites: PHYS 002A.

**Concentration: 39 units**

- **6 courses required:**
  - BIOL 006B Biological Principles 4.0 FS
    - Prerequisites: ENGL 001 (or its equivalent) with a grade of C- or higher; junior standing: BIOL 006B.
  - BIOL 207 Genetics 4.0 FS
    - Prerequisites: BIOL 006B.
  - BIOL 251 Principles of Evolution 3.0 FA
    - Prerequisites: BIOL 207.
  - BIOL 258 Fundamentals of Ecology 4.0 FS
    - Prerequisites: BIOL 006B. Some taxonomic background is recommended.
  - CHEM 070 Organic Chemistry 4.0 FS
    - Prerequisites: CHEM 037.
  - CHEM 170 Organic Chemistry 3.0 FS
    - Prerequisites: CHEM 070.

- **1 course selected from:**
  - BIOL 009 General Botany 3.0 FS
    - Prerequisites: BIOL 006B.
  - BIOL 010 General Zoology 3.0 FS
    - Prerequisites: BIOL 006B.
  - BIOL 011 General Microbiology 4.0 FS
    - Prerequisites: A college course in biology and in general chemistry.

- **1 course selected from:**
  - BIOL 202 Cell and Molecular Biology 4.0 FA
    - Prerequisites: BIOL 006B.
  - BIOL 214 Vertebrate Physiology 4.0 FS
    - Prerequisites: BIOL 006B, BIOL 010, CHEM 028 or CHEM 070.
  - BIOL 215 Plant Physiology 4.0 FS
    - Prerequisites: BIOL 006B or BIOL 008, BIOL 009, CHEM 028 or CHEM 070; or faculty permission.
  - BIOL 272 Bacterial Physiology 4.0 SP
    - Prerequisites: BIOL 011, BIOL 207, CHEM 070. CHEM 250A is recommended.

- **1 course selected from:**
  - BIOL 205 Comparative Anatomy: Vertebrates 4.0 FA
    - Prerequisites: BIOL 006B.
  - BIOL 220 Embryology 4.0 SP
    - Prerequisites: BIOL 006B.
  - BIOL 225 Plant Morphology 4.0 FA
    - Prerequisites: BIOL 006B.
  - BIOL 240 Plant Systematics 4.0 SP
    - Prerequisites: BIOL 006B or BIOL 009.
  - BIOL 250 Invertebrate Zoology 4.0 S2
    - Prerequisites: BIOL 006B.
  - BIOL 263 General Entomology 4.0 SP
    - Prerequisites: BIOL 006B.

**5-7 units required:**

Any 200-level BIOL courses or department-approved equivalents to bring the total number of units for the concentration to 39.

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**SPECIAL NOTE TO BS CANDIDATES:**

Since the BS degree program in the biological sciences requires 15 units in chemistry, you may wish to consider a supplemental authorization which would allow teaching chemistry as well. We suggest that you confer with the Biological Sciences Department’s credential adviser to explore your options.

**SUPPLEMENTARY AUTHORIZATION IN BIOLOGY**

A supplementary authorization to teach biology can be added to any valid single subject teaching credential by taking 20 units of biology or 10 units of upper-division biology courses. Courses must include molecular and cell biology, biology of organisms, and evolution. At least one course must include a laboratory. Check with the Biological Sciences Department’s credential adviser for suggested courses.

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**THE MASTER OF SCIENCE IN BIOLOGICAL SCIENCES**

**Course Requirements for the Master’s Degree: 30 units**

Continuous enrollment is required. A maximum of 9 semester units of transfer credit may be applied toward the degree.

**Graduate Time Limit:** All requirements for the degree are to be completed within five years of the end of the semester of enrollment in the oldest course applied toward the degree. See “Graduate Education” in The University Catalog for complete details on general degree requirements.

**Prerequisites for Admission to Conditionally Classified Status:**

1. Satisfactory grade point average as specified in “ Admission to Master’s Degree Programs” in The University Catalog.
2. Approval by the department and the Office of Graduate Programs.
3. An acceptable baccalaureate in biological sciences from an accredited institution, or an equivalent approved by the Office of Graduate Programs.
4. Completion of the Graduate Record Examination with a minimum combined score of 1500 on the Aptitude Test.

**Prerequisites for Admission to Classified Status:**

In addition to any requirements listed above:

1. If based on undergraduate grade point average:
   - (a) 2.75 cumulative grade point average or
   - (b) 3.00 in the last 60 units or
   - (c) 2.35 cumulative grade point average if a combined score of 2500 on the Graduate Record Examination Aptitude Test and Advanced Test in Biology is exceeded.
2. If admission is based on postbaccalaureate performance, a student may be eligible for admission to the graduate program if he/she has an undergraduate grade point average of at least 2.5 and completes 15 units of upper-division or graduate course work in biological sciences or a closely related science with a grade point average of 3.0 or better.

**Advancement to Candidacy:**

In addition to any requirements listed above:

1. Satisfactory completion of a written comprehensive qualifying examination in biological sciences following completion of BIOL 300, Research in the Biological Sciences.
2. Classification of graduate standing and completion at the university of at least 9 units of the proposed program.
3. Formation of the graduate advisory committee in consultation with the Graduate Coordinator.
4. Development of an approved program in consultation with the graduate advisory committee.

**Requirements for the MS in Biological Sciences**

Completion of all requirements as established by the departmental graduate committee, the Graduate Advisory Committee, and the Office of Graduate Programs, to include:

1. Completion of an approved program consisting of 30 units of 200/300-level courses as follows:
   - (a) At least 18 units in the discipline of biological sciences, including at least one course of 3 or more units outside the sub-discipline (i.e., botany, zoology, microbiology).
   - (b) BIOL 300. Research in the Biological Sciences, to be completed during the first fall semester.
   - (c) At least one unit of graduate seminar (BIOL 305A or BIOL 305B),

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**THE MASTER OF SCIENCE IN BIOLOGICAL SCIENCES**

**Course Requirements for the Master’s Degree: 30 units**

Continuous enrollment is required. A maximum of 9 semester units of transfer credit may be applied toward the degree.

**Graduate Time Limit:** All requirements for the degree are to be completed within five years of the end of the semester of enrollment in the oldest course applied toward the degree. See “Graduate Education” in The University Catalog for complete details on general degree requirements.

**Prerequisites for Admission to Conditionally Classified Status:**

1. Satisfactory grade point average as specified in “Admission to Master’s Degree Programs” in The University Catalog.
2. Approval by the department and the Office of Graduate Programs.
3. An acceptable baccalaureate in biological sciences from an accredited institution, or an equivalent approved by the Office of Graduate Programs.
4. Completion of the Graduate Record Examination with a minimum combined score of 1500 on the Aptitude Test.

**Prerequisites for Admission to Classified Status:**

In addition to any requirements listed above:

1. If based on undergraduate grade point average:
   - (a) 2.75 cumulative grade point average or
   - (b) 3.00 in the last 60 units or
   - (c) 2.35 cumulative grade point average if a combined score of 2500 on the Graduate Record Examination Aptitude Test and Advanced Test in Biology is exceeded.
2. If admission is based on postbaccalaureate performance, a student may be eligible for admission to the graduate program if he/she has an undergraduate grade point average of at least 2.5 and completes 15 units of upper-division or graduate course work in biological sciences or a closely related science with a grade point average of 3.0 or better.

**Advancement to Candidacy:**

In addition to any requirements listed above:

1. Satisfactory completion of a written comprehensive qualifying examination in biological sciences following completion of BIOL 300, Research in the Biological Sciences.
2. Classification of graduate standing and completion at the university of at least 9 units of the proposed program.
3. Formation of the graduate advisory committee in consultation with the Graduate Coordinator.
4. Development of an approved program in consultation with the graduate advisory committee.

**Requirements for the MS in Biological Sciences**

Completion of all requirements as established by the departmental graduate committee, the Graduate Advisory Committee, and the Office of Graduate Programs, to include:

1. Completion of an approved program consisting of 30 units of 200/300-level courses as follows:
   - (a) At least 18 units in the discipline of biological sciences, including at least one course of 3 or more units outside the sub-discipline (i.e., botany, zoology, microbiology).
   - (b) BIOL 300. Research in the Biological Sciences, to be completed during the first fall semester.
   - (c) At least one unit of graduate seminar (BIOL 305A or BIOL 305B),
completed during the first year.
(d) At least 18 of the units required for the degree in 300-level courses.
(e) Not more than 9 semester units of transfer and/or extension credit (correspondence courses and U.C. extension course work are not acceptable).
(f) Not more than 15 units taken before admission to classified status.
(g) Not more than 2 units of Independent Study (398) and 6 units of Master’s Thesis (399).
2. Completion and final approval of an independent research project resulting in an acceptable thesis as specified by the student’s Graduate Advisory Committee.
3. Presentation of a seminar based on the student’s master’s thesis research. This seminar will usually be given during the semester in which the student plans to complete the degree requirements.
4. Approval by the departmental graduate committee and the Graduate Coordinators Committee on behalf of the faculty of the university.

Graduate Literacy Requirement:
Writing proficiency is a graduation requirement. Biological sciences majors will demonstrate their writing competence through satisfactory completion of a designated portion of the qualifying examination required as a prerequisite for admission to candidacy.

Graduate Grading Requirements:
All courses in the major (with the exceptions of Independent Study-398 and Master’s Study-399) must be taken for a letter grade, except those courses specified by the department as ABC/No Credit (200-level courses), AB/No Credit (300-level courses), or Credit/No Credit grading only. A maximum of 10 units combined of ABC/No Credit, AB/No Credit, and Credit/No Credit grades may be used on the approved program (including 398, 399, and courses outside the major). While grading standards are determined by individual programs and instructors, it is the policy of the university that unsatisfactory grades may be given when work fails to reflect achievement of the high standards, including high writing standards, expected of students pursuing graduate study.

Graduate Advising Requirement:
Advising is mandatory each semester for biological sciences majors. Consult the Graduate Coordinator for specifics.

THE MASTER OF SCIENCE IN BOTANY

Course Requirements for the Master’s Degree: 30 units
Continuous enrollment is required. A maximum of 9 semester units of transfer credit may be applied toward the degree.

Graduate Time Limit: All requirements for the degree are to be completed within five years of the end of the semester of enrollment in the oldest course applied toward the degree. See “Graduate Education” in The University Catalog for complete details on general degree requirements.

Prerequisites for Admission to Conditionally Classified Status:
1. Satisfactory grade point average as specified in “Admission to Master’s Degree Programs” in The University Catalog.
2. Approval by the department and the Office of Graduate Programs. Prerequisites are the same as for the Master’s degree in Biological Sciences.

Prerequisites for Admission to Classified Status:
In addition to any requirements listed above:
Prerequisites are the same as for the Master’s degree in Biological Sciences.

Advancement to Candidacy:
Prerequisites are the same as for the Master’s degree in Biological Sciences.

Requirements for the MS in Botany:
Requirements are the same as for the Master’s degree in Biological Sciences.

Graduate Literacy Requirement:
Writing proficiency is a graduation requirement. Botany majors will demonstrate their writing competence through satisfactory completion of a designated portion of the qualifying examination required as a prerequisite for advancement to candidacy.

Graduate Grading Requirements:
All courses in the major (with the exceptions of Independent Study-398 and Master’s Study-399) must be taken for a letter grade, except those courses specified by the department as ABC/No Credit (200-level courses), AB/No Credit (300-level courses), or Credit/No Credit grading only. A maximum of 10 units combined of ABC/No Credit, AB/No Credit, and Credit/No Credit grades may be used on the approved program (including 398, 399, and courses outside the major). While grading standards are determined by individual programs and instructors, it is the policy of the university that unsatisfactory grades may be given when work fails to reflect achievement of the high standards, including high writing standards, expected of students pursuing graduate study.

Students must maintain a 3.0 grade point average in all course work on the approved master’s degree program as well as in all course work taken subsequent to admission to conditionally classified status.

Graduate Advising Requirement:
Advising is mandatory each semester for all botany majors. Consult the Graduate Coordinator for specifics.

The Faculty
Michael A. Abruzzo, 1973, Professor, PhD, Mich St U.
Douglas G. Alexander, 1965, Professor Emeritus, PhD, U NC.
Raymond J. Barnett, 1976, Professor, PhD, Duke U.
Jeffrey R. Bell, 1992, Professor, PhD, USC.
Kristopher A. Blee, 2001, Assist Professor, PhD, Utah St U.
Dwayne H. Curtis, 1963, Professor Emeritus, PhD, U Utah.
Jonathan R. Day, 2000, Assist Professor, PhD, U Delaware.
Richard S. Demaree Jr., 1972, Professor Emeritus, PhD, CO State U.
Wesley H. Dempsey, 1954, Professor Emeritus, PhD, UC Davis.
William F. Derr, 1964, Professor Emeritus, PhD, U WI.
Patricia L. Edelmann, 1976, Chair, Professor, PhD, UC Davis.
Robert I. Ediger, 1967, Professor Emeritus, PhD, Kansas St.
Michael J. Erpino, 1968, Professor Emeritus, PhD, U Wyoming.
Larry F. Hanne, 1983, Professor, PhD, U Texas.
James Lj. Houpis, 2001, Dean, Administrator, PhD, UC Berkeley.
Robbins S. King, 1956, Professor Emeritus, PhD, Stanford U.
David H. Kistner, 1959, Professor Emeritus, PhD, U Chicago.
Donald T. Kowalski, Professor Emeritus, PhD, U Michigan.
Roger J. Lederer, 1972, Professor Emeritus, PhD, U Illinois.
John R. Mahoney, 1997, Assoc Professor, PhD, U MN.
Michael P. Marchetti, 2000, Assist Professor, PhD, UC Davis.
Beverly A. Marcum, 1982, Professor, PhD, U Virginia.
Paul E. Maslin, 1970, Professor Emeritus, PhD, U Florida.
Allie B. McInteegart, 1969, Professor, PhD, U Texas.
Robert B. McNairn, 1967, Professor Emeritus, PhD, UC Davis.
Donald G. Miller III, 2002, Assist Professor, PhD, UC Berkeley.
James C. Pushnik, 1989, Professor, PhD, Utah St U.
Kristina A. Schierenbeck, 1998, Assoc Professor, PhD, WA State U.
Robert A. Schlinger, 1973, Professor, PhD, UC Berkeley.
William L. Stephens, 1963, Professor Emeritus, PhD, UC Davis.
Kingsley R. Stern, 1959, Professor Emeritus, PhD, U MN.
Robert E. Thomas, 1966, Professor Emeritus, PhD, U St U.
Alan R. Wilhelm, 1969, Professor Emeritus, PhD, U WI.
Dawn S. Wilson, 1999, Assist Professor, PhD, So Florida.
Gordon V. Wolfe, 2000, Assist Professor, PhD, U of WA.
David M. Wood, 1990, Professor, PhD, U of WA.
Biological Sciences Course Offerings

Please see the section on "Course Description Symbols and Terms" in The University Catalog for an explanation of course description terminology and symbols, the course numbering system, and course credit units. All courses are lecture and discussion and employ letter grading unless otherwise stated. Some prerequisites may be waived with faculty permission. Many syllabi are available on the Chico Web.

Some 200- and 300-level courses are on an alternate-year schedule. Check with Department of Biological Sciences Office for schedule.

**BIOl 001 Concepts of Biology**
3.0 Fa/Spr
Study of the nature and interaction of living things on the planet. Includes cell organization; diversity and structure of plants and animals; DNA and genetics; ecology; and evolution. Primarily for students without a strong high school biology or chemistry background. 2.0 hours lecture, 5.0 hours laboratory. This is an approved General Education course.

**BIOl 003 Human Anatomy**
3.0 Fa/Spr
Study of the structure of the human body, to include muscles, bones, heart, brain, ear, eye, and other systems, as well as a short look at development of the fetus. Lab work entails dissection of the cat and study of heart, brain, ear, eye, and other systems, as well as a short look at development of the fetus. 2.0 hours lecture, 3.0 hours laboratory. This is an approved General Education course.

**BIOl 004 Human Physiology**
3.0 Fa/Spr
Basic functioning of the organ systems of the human body, including the brain and nervous system; vision and hearing; heart and circulation; blood and immunity; respiration, digestion and metabolism; muscles; excretory, endocrine, and reproductive systems. 2.0 hours lecture, 3.0 hours laboratory. This is an approved General Education course. CAN BIOl 12.

**BIOl 005 Food, Fiber, and Drugs**
3.0 Fa/Spr
Designed specifically for non-majors. Emphasis on broad biological principles, as illustrated by plants, and the economic importance and role of plants in human ecology. 2.0 hours lecture, 3.0 hours laboratory.

**BIOl 006A Biological Principles**
4.0 Fa/Spr
Prerequisites: Recommended CHM 037 or concurrent enrollment. Introduction to evolutionary history and biological diversity, microorganisms and protists, invertebrates, vertebrates, and plants. Form and function of plants and animals. Ecological principles. 3.0 hours lecture, 3.0 hours laboratory. Special fee required; see The Class Schedule.

**BIOl 006B Biological Principles**
4.0 Fa/Spr
Prerequisites: BIOl 006A, recommended CHM 037 or concurrent enrollment. Introduction to evolutionary history and biological diversity, microorganisms and protists, invertebrates, vertebrates, and plants. Form and function of plants and animals. Ecological principles. 3.0 hours lecture, 3.0 hours laboratory. Special fee required; see The Class Schedule.

**BIOl 007 Museum Techniques**
2.0 Inquire
Prerequisites: Previous biological course work is recommended. Techniques of preparing biological specimens for study and display, with emphasis on vertebrate specimens. Museum and taxidermy mounts, wet and dry skeletons, and other preservation and display techniques will be covered. Practical work will be stressed. 1.0 hour lecture, 3.0 hours laboratory.

**BIOl 008 Principles of Biology — Honors**
3.0 Fa/Spr
Prerequisites: Acceptance into the Honors Program; high school biology and chemistry; faculty permission.
Principles of biology as illustrated in plant and animal groups; cellular structure and function; metabolism; mechanisms of mitosis, meiosis, heredity, and evolution; nature of the gene; principles of ecology. For students in the Honors in General Education program. 3.0 hours discussion, 3.0 hours laboratory. This is an approved General Education course.

**BIOl 008H Principles of Biology — Honors**
4.0 Fall
Prerequisites: Acceptance into the Honors Program; high school biology and chemistry; faculty permission.
Principles of biology as illustrated in plant and animal groups; cellular structure and function; metabolism; mechanisms of mitosis, meiosis, heredity, and evolution; nature of the gene; principles of ecology. For students in the Honors in General Education program. 3.0 hours discussion, 3.0 hours laboratory. This is an approved General Education course.

**BIOl 009 General Botany**
3.0 Fa/Spr
Prerequisites: BIOl 008 or faculty permission. Introduction to morphology, physiology, ecology, and evolution of all plant groups. 2.0 hours lecture, 3.0 hours laboratory. Special fee required; see The Class Schedule. CAN BIOl 6.

**BIOl 100 General Zoology**
3.0 Fa/Spr
Prerequisites: BIOl 008A or faculty permission.
Introduction to the animal kingdom, emphasizing relationships, adaptations, development, morphology, and physiology of the major groups. 2.0 hours lecture, 3.0 hours laboratory. Special fee required; see The Class Schedule. CAN BIOl 14.

**BIOl 101 General Microbiology**
4.0 Fa/Spr
Prerequisites: A college course in biology and in general chemistry.
Introduction to structure/function, metabolism, genetics, ecological interactions and pathogenic mechanisms of microorganisms. In addition, the role of microorganisms in natural and in the food and biotechnology industries will be discussed. 3.0 hours lecture, 3.0 hours laboratory. Special fee required; see The Class Schedule. CAN BIOl 14.

**BIOl 098 Special Topics**
1.0-3.0 Fa/Spr
This course is for special topics offered as 098A-C for 1.0 to 3.0 units respectively. Typically the topic is offered on a one-time-only basis and may vary from term to term and be different for different sections. See The Class Schedule for the specific topic being offered.

**BIOl 102 Evolution**
3.0 Spring
Prerequisites: BIOl 001 or BIOl 008 or equivalent.
Analysis of the evidence for evolution and the nature of the process. Darwinism, neo-Darwinism, sociobiology, conflicts and misconceptions regarding evolution, creationism, and evolution of the human body and mind will be considered. This is an approved General Education course.

**BIOl 103 Human Genetics**
3.0 Fa/Spr
Prerequisites: One biological sciences course.
The inheritance, expression, and evolution of the genetic material in humans. Topics include genetic engineering, gene therapy, prenatal diagnosis, cancer, the human genome project, genetic influences on human behavior, such as homosexuality and mental illness, and the social and ethical consequences of these new technologies. This is an approved General Education course.

**BIOl 107 Microbes and Disease**
3.0 Spring
Prerequisites: BIOl 001 or BIOl 008. Not open for credit to students majoring in microbiology or who have taken, or are taking, BIOl 011.
Overview of infectious diseases, immunological diseases, vaccines, and modern approaches to disease control.

**BIOl 111 Ecology and Natural History of the Pacific Basin Regions**
3.0 Spring
Prerequisites: BIOl 001 or equivalent.
An examination of the natural history of the regions of the Pacific Basin, the interconnections among their plants and animals, and the ecological principles which underlie these phenomena, including environmental problems currently faced by each Pacific Basin region. This is an approved General Education course.

**BIOl 115 Human Biology**
3.0 Spring
Prerequisites: One biological sciences course. Preferrably introductory biology.
A study of human beings from a biological perspective, including their evolution, physiology, behavior, and ecology.

**BIOl 116 Science and Human Values**
3.0 Fa/Spr
Prerequisites: BIOl 001 or BIOl 008.
Critically examines scientific and humanistic world views and sensibilities, directly applying these approaches to contemporary social and personal problems. This is an approved General Education course.

**BIOl 116H Science and Human Values — Honors**
3.0 Fall
Prerequisites: Acceptance into the Honors Program; faculty permission.
Critically examines scientific and humanistic world views and sensibilities, directly applying these approaches to contemporary social and personal problems. This is an approved General Education course. This course is the same as PHIL 116H which may be substituted.

**BIOl 118 Biology of Childhood**
3.0 Fa/Spr
Prerequisites: One or more biological sciences courses.
Basic biological principles including the scientific method, reproduction, development, physiology, and anatomy. The biological basis of childhood diseases, immunity, nutrition, issues of health and well-being, and the relevance of biological information in social, political, and ethical decision making regarding children. This is an approved General Education course.

**BIOl 123 Microtechnique**
2.0 Inquire
Prerequisites: BIOl 008B. Preparation of tissues for light microscope examination. For biology majors, technicians, and pre-medical students. 6.0 hours laboratory.

**BIOl 134 Conservation Ecology**
3.0 Fa/Spr
Prerequisites: BIOl 001 or equivalent.
An examination of ecological principles and the impact of increasing population and technology upon the environment. This is an approved General Education course.
BIOL 141 Agricultural Entomology and Insect Control 3.0 Spring
Prerequisites: BIOL 006A or BIOL 008.
Recognition, taxonomy, morphology, and life histories of agriculturally important insects. Control measures, including biological, cultural, and chemical. 2.0 hours discussion, 3.0 hours laboratory.

BIOL 142 Field Biology 3.0 Fa/Spr
Prerequisites: BIOL 003 or BIOL 008.
Plant and animal morphology, classification, and ecological relationships examined through field and laboratory study. 2.0 hours discussion, 3.0 hours laboratory. Special fee required; see The Class Schedule.

BIOL 152 Computer Applications in Biology 3.0 Spring
Prerequisites: BIOL 006B and a computer science course providing skills in programming. Recommended: MATH 007A or a statistics course.
Models of biological processes and systems will be used to introduce the potentials for computing in biological research. 2.0 hours seminar, 3.0 hours laboratory.

BIOL 189 Clinical Laboratory Observation 1.0 Fa/Spr
Prerequisites: Microbiology/Clinical Laboratory Science majors with no previous clinical laboratory experience and who have completed BIOL 216 or CHEM 252, faculty permission.
Students observe in a clinical hospital laboratory and in a private clinical laboratory. Credithno credit grading only.

BIOL 195 Biology of Cancer 3.0 Spring
Prerequisites: BIOL 2 or BIOL 008.
An introduction to cancer; what it is, what causes it, and how it is diagnosed and treated. This is an approved General Education course.

BIOL 198 Special Topics 1.0-3.0 Fa/Spr
This course is for special topics offered as 198A-C for 1.0 to 3.0 units respectively. Typically the topic is offered on a one-time-only basis and may vary from term to term and be different for different sections. See The Class Schedule for the specific topic being offered.

BIOL 199 Special Problems 1.0-3.0 Fa/Spr
This course is an independent study of special problems and is offered as 199A-C for 1.0 to 3.0 units respectively. You must register directly with a supervising faculty member. Research in biology under direct supervision of faculty member. For majors only. This course counts toward the upper-division biology units required for the BS. Credithno credit grading only.

BIOL 201 Introduction to Biological Literature 1.0 Fa/Spr
Prerequisites: ENGL 100 or its equivalent with a grade of C- or higher; junior standing; BIOL 006B.
Majors are expected to take this course prior to or concurrently with enrollment in any 200-level biology course. Principles of library research, scientific writing, and scientific data recording. This is a writing proficiency, WP, course; a grade of C- or better certifies writing proficiency for majors.

BIOL 202 Cell and Molecular Biology 4.0 Fall
Prerequisites: BIOL 006B.
Introductory analysis of the structure and related functions of cells with an emphasis on the molecular mechanisms involved in membrane function, signal transduction, intracellular compartments and transport, cell division, and apoptosis. 3.0 hours discussion, 3.0 hours laboratory.

BIOL 203 Histology 4.0 Od/Spr
Prerequisites: BIOL 006B, BIOL 010.
Microscopic analysis of tissues, organs, and organ systems of vertebrates emphasizing mammalian histophisiology. 3.0 hours discussion, 3.0 hours laboratory.

BIOL 205 Comparative Anatomy of the Vertebrates 4.0 Fall
Prerequisites: BIOL 006B, BIOL 010.
Explanation of the anatomical similarities and differences of selected vertebrates. The evolution and adaptive significance of various systems are considered. 2.0 hours discussion, 6.0 hours laboratory.

BIOL 206 Cell Physiology 3.0 Spring
Prerequisites: BIOL 006B, CHEM 028 or CHEM 070.
Detailed study of cellular function, with emphasis on regulation of cellular processes, modern experimental techniques, and a chemical approach to the cell in general. 2.0 hours discussion, 3.0 hours laboratory.

BIOL 207 Genetics 4.0 Fa/Spr
Prerequisites: BIOL 006B.
A detailed study of the principles of classical, molecular, and population/evolutionary genetics. Activities will include computer simulations of segregation, linkage, and population genetics, internet-based database searches for genetic diseases and cloned genes, and searches of the current genetic literature. 3.0 hours lecture, 1.0 hour discussion.

BIOL 208 Hematology 3.0 Od/Spr
Prerequisites: BIOL 006B. Recommended: BIOL 212 and CHEM 070.
The study of blood in normal and abnormal conditions. 2.0 hours discussion, 3.0 hours laboratory.

BIOL 212 Parasitology 4.0 Od/Spr
Prerequisites: BIOL 006B or equivalent and BIOL 010.
Biology of human and animal parasites, with emphasis on life cycles and control strategies. 3.0 hours discussion, 3.0 hours laboratory.

BIOL 214 Vertebrate Physiology 4.0 Fa/Spr
Prerequisites: BIOL 006B. BIOL 009; CHEM 028 or CHEM 070.
General features of vertebrate physiology. Function of muscular, nervous, respiratory, circulatory, excretory, and endocrine systems. 2.0 hours discussion, 6.0 hours laboratory.

BIOL 215 Plant Physiology 4.0 Fa/Spr
Prerequisites: BIOL 006B or BIOL 008; BIOL 009; CHEM 028 or CHEM 070; or faculty permission.
Functions in higher plants: water and soil relations, photosynthesis, respiration, enzyme action, and growth. 3.0 hours discussion, 3.0 hours laboratory.

BIOL 216 Medical Bacteriology 5.0 Fall
Prerequisites: BIOL 011; BIOL 270; CHEM 070.
Immunization against tetanus and diphtheria required. Biological characteristics of medically important bacteria. Mechanisms of pathogenesis and host-resistance. Laboratory procedures for isolation and identification. 3.0 hours discussion, 6.0 hours laboratory. Special fee required; see The Class Schedule.

BIOL 217 Medical Genetics 3.0 Spring
Prerequisites: BIOL 201.
Lectures on genetic diseases in humans, emphasizing the biochemical and molecular advances in diagnosis, treatment, gene therapy, and prevention. A significant portion of the course will deal with the molecular biology of cancer and the Human Genome Project.

BIOL 218 General Virology 4.0 EvnFall
Prerequisites: BIOL 006B. Recommended: BIOL 011.
The physical, chemical, and biological properties of bacteria and animal viruses, and their interactions with the host at cellular and organismic levels. 3.0 hours discussion, 3.0 hours laboratory. Special fee required; see The Class Schedule.

BIOL 219 Food and Industrial Microbiology 3.0 Spring
Prerequisites: BIOL 011; CHEM 070.
Study of micro-organisms of industrial importance, emphasizing nutrition, metabolism, cultivation, and processing.

BIOL 220 Embryology 4.0 Spring
Prerequisites: BIOL 006B. BIOL 010 or faculty permission.
Principles and theories of animal development, emphasizing the vertebrate. 3.0 hours discussion, 3.0 hours laboratory.

BIOL 223 Plant Anatomy and Development 4.0 Spring
Prerequisites: BIOL 006B.
Plant anatomical study with inclusion of modern genetic methods of analysis for a molecular understanding of plant development. Developmental concepts include biochemical signal, genetic control of cell division, cell differentiation and cell death in relationship to formation of the plant body and life cycle completion. 3.0 hours lecture, 3.0 hours laboratory.

BIOL 225 Plant Morphology 4.0 Fall
Prerequisites: BIOL 006B or BIOL 009.
Comparative morphology of plant and fungal types, emphasizing evolution of structures and methods of reproduction. 3.0 hours discussion, 3.0 hours laboratory.

BIOL 226 Phylogey 3.0 Spring
Prerequisites: BIOL 006B.
Reproduction, morphology, taxonomy, and economic importance of the algae. Field and laboratory work with both freshwater and marine representatives. 2.0 hours discussion, 3.0 hours laboratory.

BIOL 227 Mycology 4.0 Inquire
Prerequisites: BIOL 006B, BIOL 009.
A survey of the fungi, with emphasis upon structure and development, classification, and economic importance. 2.0 hours discussion, 6.0 hours laboratory.

BIOL 228 Plant Pathology 4.0 Fall
Prerequisites: BIOL 006B.
Study of plant pathology encompassing parasitism and disease in plants, pathogen attack strategies, diseased plant physiology, plant defense mechanisms, environmental effects on disease and descriptions of diseases and treatments. 3.0 hours lecture, 3.0 hours laboratory.

BIOL 230 Developmental Biology 3.0 EvnFall
Prerequisites: BIOL 006B.
Includes concepts of macro-molecular assembly, biochemical signals, genetic controls, and morphological processes involved during development of organisms. The experimentally oriented laboratory exercises cover cell differentiation in fungi, plants, and animals, cell movement and communication mechanisms, teratogenic effects on limb development, regeneration, and metamorphosis. 2.0 hours discussion, 3.0 hours laboratory.
BIOL 240: Plant Systematics 4.0 Spring
Prerequisites: BIOL 006B and BIOL 009, or faculty permission.
Principles of plant classification with field study of local flora, emphasizing
the higher plants and their phylogenetic relationships. 2.0 hours discussion,
6.0 hours laboratory. Special fee required; see The Class Schedule.

BIOL 250: Invertebrate Zoology 4.0 EvnSprg
Prerequisites: BIOL 006B, BIOL 010.
A survey of the basic biology of the principal invertebrate phyla. Emphasis
placed both on morphology and contribution of each group to biological
principles. 2.0 hours discussion, 6.0 hours laboratory.

BIOL 251: Principles of Evolution 3.0 Fall
Prerequisites: BIOL 207.
A detailed study of the evolutionary process, including history, natural
selection, population genetics, molecular evolution, speciation, coevolution,
and macroevolution.

BIOL 254: Field Ecology 3.0 Inquire
Prerequisites: BIOL 006B.
Principles of ecology illustrated in the context of biotic communities of
northern California. Field studies using quantitative and qualitative ap-
proaches. Laboratory segment offered at Eagle Lake Biological Field
Station. 1.0 hour discussion, 6.0 hours laboratory.

BIOL 255: Plant Geography 2.0 Fall
Prerequisites: BIOL 006B, BIOL 009. Recommended: BIOL 240.
Discussion of the major plant communities with interpretation of environ-
mental, microbial, and evolutionary processes affecting their distribution.

BIOL 255L: Plant Geography Laboratory 1.0 EvnFall
Prerequisites: Concurrent enrollment in or prior completion of BIOL 255.
Field trips to local plant communities and laboratory work emphasizing
range patterns of California plants. 3.0 hours laboratory. Special fee
required; see The Class Schedule.

BIOL 256: Animal Behavior 3.0 OddFall
Prerequisites: BIOL 006B, BIOL 010.
Consideration of the basic problems in animal behavior, including orient-
tation, social behavior, and the nature and organization of animal societies.
2.0 hours discussion, 3.0 hours laboratory.

BIOL 258: Fundamentals of Ecology 4.0 Fa/Spr
Prerequisites: BIOL 006B. Some taxonomic background is recommended.
Interrelationships among living organisms, field observations of such phe-
nomena. Application of quantitative and qualitative methods to the inter-
pretation of ecological phenomena. 2.0 hours discussion, 6.0 hours labo-
ratory. Special fee required; see The Class Schedule.

BIOL 259: Aquatic Ecology 4.0 Fall
Prerequisites: BIOL 006B, CHEM 038.
Physical, chemical, and biological factors influencing the ecology of inland
waters. 3.0 hours lecture, 3.0 hours laboratory. Special fee required; see The Class Schedule.

BIOL 261: Ichthyology 4.0 EvnSprg
Prerequisites: BIOL 006B, BIOL 010.
Morphology, ecology, behavior, and systematics of California fishes, with
an introduction to fisheries biology. 2.0 hours discussion, 6.0 hours laboratory.
Special fee required; see The Class Schedule.

BIOL 262: Field Botany 2.0 Summer
Prerequisites: BIOL 006B, BIOL 009.
An examination of the ecological factors of plant distribution; taxonomy
of the plants of biotic communities of northeastern California. Offered
only at Eagle Lake Biological Field Station. 1.0 hour discussion, 3.0
hours laboratory.

BIOL 263: General Entomology 4.0 Spring
Prerequisites: BIOL 006B or faculty permission. Recommended: BIOL 010.
The morphology, ecology, and physiology of insects. Economic entomology
and medical entomology, and taxonomy. 2.0 hours discussion, 6.0 hours
laboratory.

BIOL 264: Herpetology 4.0 O ddSprg
Prerequisites: BIOL 010.
The morphology, evolution, physiology, behavior, ecology, and taxonomy
of amphibians and reptiles. California amphibians and reptiles are
emphasized, including field studies of local species. 3.0 hours lecture,
3.0 hours laboratory. Special fee required; see The Class Schedule.

BIOL 265: Ornithology 4.0 EvnSprg
Prerequisites: BIOL 006B, BIOL 010.
The morphology, evolution, ecology, physiology, taxonomy, and behav-
ior of birds, including field studies of local species. 2.0 hours discussion,
6.0 hours laboratory. Special fee required; see The Class Schedule.

BIOL 266: Mammalogy 3.0 Fall
Prerequisites: BIOL 010.
Study of evolution, anatomy, physiology, ecology, and behavior of mam-
mals. California mammals will be emphasized in lab. 2.0 hours discussion,
3.0 hours laboratory.

BIOL 267: Veterinary and Medical Entomology 3.0 EvnFall
Prerequisites: BIOL 010.
Epidemiology of arthropod diseases, especially transmitted to humans and
domestic animals by insects; identification, control, and biology of the vec-
tors. Course approved by Structural Pest Control Board for 8 technical
points. Continuing Education.

BIOL 269: Neurophysiology 4.0 Spring
Prerequisites: BIOL 006B, BIOL 010; CHEM 028 or CHEM 070.
This course provides students with background and fundamental informa-
tion necessary to pursue neuroscience at the graduate or professional
level. Cellular and molecular mechanisms within mammalian central
nervous system are emphasized. 3.0 hours lecture, 3.0 hours laboratory.
Special fee required; see The Class Schedule.

BIOL 270: Immunology 4.0 Spring
Prerequisites: BIOL 006B.
The development and expression of the immune response, the basic prin-
ciples of antigen-antibody reactions and their relevance to medicine, genetics,
taxonomy, and evolution. 3.0 hours discussion, 3.0 hours laboratory.

BIOL 272: Bacterial Physiology 4.0 Spring
Prerequisites: BIOL 011, BIOL 207, CHEM 070. CHEM 250A is recommended.
Study of bacterial structure and function, modes of metabolism, regula-
tory responses to environmental change and stress, and microbial aspects
of nutrition and growth. 3.0 hours discussion, 3.0 hours laboratory.

BIOL 273: Microbial Genetics 4.0 Fall
Prerequisites: BIOL 006B.
The molecular basis of mutation and recombination, mechanism of gene
transfer, transcription in bacteria and bacteriophages, genetics and biochem-
istry of regulation of bacterial operons, and bacteriophage development,
and recombinant DNA application to genetic engineering. 3.0 hours discussion,
3.0 hours laboratory.

BIOL 275: Microbial Ecology 4.0 Spring
Prerequisites: BIOL 006B, Recommended: BIOL 011.
The roles and interactions of viruses, bacteria, algae, protozoa, and fungi
in the natural and human environment; stressing fundamental principles
of ecology and evolution. 3.0 hours lecture, 3.0 hours laboratory.

BIOL 279: Zooroarchaeology and Field Ecology 3.0 Summer
Prerequisites: BIOL 006A and BIOL 006B or equivalent.
This comprehensive field course introduces students to zooroarchaeology,
vertebrate osteology, fragmentary bone identification, as well as verte-
brate ecology and natural history through a spectrum of lectures, labora-
tory exercises and field activities. This course is offered at the Eagle Lake
Biological Field Station. 1.0 hour lecture, 6.0 hours laboratory.
This course is the same as ANTH 279 which may be substituted.

BIOL 289: Internship 1.0-3.0 Fa/Spr
Prerequisites: Necessary background for the specific internship; faculty
permission. This internship course is offered as 298A-C for 1.0 to 3.0 units. You must
register with a supervising faculty member. The internship program is de-
signed to provide students with direct field or laboratory research experience
in occupational settings. Credit/no credit grading only.

BIOL 291: Senior Seminar in Biology 1.0 Fa/Spr
Prerequisites: Senior standing.
Presentation and discussion of scientific reports based on current literature.
Credit/no credit grading only.

BIOL 292: Seminars in Biological Science 1.0 Fa/Spr
Prerequisites: Junior or senior standing or faculty permission.
Analysis of seminars on various topics in the biological sciences.
Credit/no credit grading only. You may take this course more than once
for a maximum of 6.0 units.

BIOL 295: Electron Microscopy 2.0 Spring
Prerequisites: PHYS 002A; PHYS 002B.
Introduction to electron optics and electron microscope construction.
Electron microscope operation by demonstration only.

BIOL 296: Field Studies in Natural History 1.0-3.0 Fa/Spr
Prerequisites: BIOL 006A, PHYS 002A, PHYS 002B.
Electron microscope operation by demonstration only.

BIOL 298 Special Topics 1.0-4.0 Fa/Spr
This course is for special topics offered as 298A-D for 1.0 to 4.0 units res-
spectively. Typically the topic is offered on a one-time-only basis and
may vary from term to term and be different for different sections. See The Class Schedule for the specific topic being offered.
### Biological Sciences

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