BIOLOGICAL SCIENCES (BIOL)

See Course Description Symbols and Terms (https://catalog.csuchico.edu/academic-standards-policies/course-description-symbols-terms/) for an explanation of course description terminology and symbols, the course numbering system, and course credit units.

BIOL 102 Introduction to Living Systems 3 Units GE
Typically Offered: Fall and spring
An integrated study of the nature and interactions of living things and their environments. This course is an introduction to the processes of evolution and speciation, ecology and ecosystem processes, cellular biology and organismal physiology. The course is primarily for students without a strong background in high school biology or chemistry. The course includes online content delivery, in-class discussion, and a hands-on activity session. 2 hours activity, 2 hours discussion. (020372)
General Education: Laboratory Activity (B3); Life Science (B2)
Cross listing(s): SCED 102
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Lower Division

BIOL 103 Human Anatomy 4 Units GE
Typically Offered: Spring, summer, fall
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 the human skeleton. 2 hours activity, 3 hours lecture. (001110)
General Education: Laboratory Activity (B3); Life Science (B2)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Lower Division

BIOL 104 Human Physiology 4 Units GE
Typically Offered: Fall and spring
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 hours activity, 3 hours lecture. (001114)
General Education: Laboratory Activity (B3); Life Science (B2)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Lower Division

BIOL 105 Food, Fiber, and Drugs 3 Units GE
Typically Offered: Fall and spring
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 hours activity, 2 hours lecture. (001119)
General Education: Laboratory Activity (B3); Life Science (B2)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Lower Division

BIOL 109 The Biological University Experience 1 Unit
Typically Offered: Fall and spring
A university success course for biology majors new to California State University, Chico. Appropriate for all incoming freshmen and transfer students. The course explores academic and social opportunities in addition to resources available to promote successful completion of the student's educational goals. Meets twice a week for the first half of the semester. 1 hour lecture. (021133)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 1 unit
Course Attributes: Lower Division

BIOL 161 Principles of Ecological, Evolutionary, and Organismal Biology 4 Units GE
Typically Offered: Fall and spring
Introduction to evolutionary history and biological diversity, microbes and protists, invertebrates, vertebrates, and plants. Form and function of plants and animals. Ecological principles. 3 hours laboratory, 3 hours lecture. (001123)
General Education: Laboratory Activity (B3); Life Science (B2)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Lower Division; Sustainable Course

BIOL 162 Principles of Cellular and Molecular Biology 4 Units GE
Prerequisite: CHEM 107 or CHEM 111; or department permission.
Typically Offered: Fall and spring
Introduction to biological molecules, bioenergetics, cellular structure and function, elements of molecular biology and genetics, and mechanisms of macroevolution and systematics. 3 hours laboratory, 3 hours lecture. (001122)
General Education: Laboratory Activity (B3); Life Science (B2)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Lower Division; Sustainable Course

BIOL 163 Principles of Physiology and Development 4 Units GE
Prerequisite: BIOL 162 or department permission.
Typically Offered: Fall and spring
Introduction to plant and animal physiology and development. Laboratory consists of small group independent investigations of biological questions that include student-devised experiments; application of biological techniques, data analysis, and peer reviewed presentation of results. 3 hours laboratory, 3 hours lecture. (020284)
General Education: Laboratory Activity (B3); Life Science (B2)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Lower Division

BIOL 198 Special Topics 1-3 Units
Typically Offered: Fall and spring
This course is for special topics offered for 1.0-3.0 units. 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. 3 hours discussion. (001135)
Grade Basis: Graded
Repeatability: You may take this course more than once
Course Attributes: Lower Division
BIOL 211  Allied Health Microbiology  4 Units
Prerequisite: CIVL 175; or BIOL 103, BIOL 104, BIOL 162, or SCED 102 and CHEM 107, CHEM 108, or CHEM 111.
Typically Offered: Fall and spring
Introduction to structure/function, metabolism, genetics, ecological interactions and pathogenic mechanisms of microorganisms. In addition, the roles of microorganisms in sanitation and in the food and biotechnology industries will be discussed. 3 hours laboratory, 3 hours lecture. (001132)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Lower Division

BIOL 299  Special Problems  1-3 Units
Typically Offered: Fall and spring
This course is an independent study of special problems. You must register directly with a supervising faculty member. 0 hours supervision. (022467)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Lower Division

BIOL 302  Evolution  3 Units GE
Prerequisite: One biological sciences course; GE Oral Communication (A1); GE Written Communication (A2); GE Critical Thinking (A3); GE Mathematics/Quantitative Reasoning (B4) requirements, or consent of the instructor.
Typically Offered: Fall and spring
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 are considered. 3 hours discussion. (001139)
General Education: Upper-Division Scientific Inq/Quant Reason (UBD); Race, Ethnicity, and Sovereignty Pathway; Science, Technology, and Society Pathway
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

BIOL 302W  Evolution (W)  3 Units GE, W
Prerequisite: One biological sciences course; GE Oral Communication (A1); GE Written Communication (A2); GE Critical Thinking (A3); GE Mathematics/Quantitative Reasoning (B4) requirements, or consent of the instructor.
Typically Offered: Fall and spring
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 are considered. 1 hour discussion, 2 hours lecture. (021355)
General Education: Upper-Division Scientific Inq/Quant Reason (UBD); Race, Ethnicity, and Sovereignty Pathway; Science, Technology, and Society Pathway
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division; Writing Course

BIOL 303  Human Genetics  3 Units GE
Prerequisite: One biological sciences course; GE Oral Communication (A1); GE Written Communication (A2); GE Critical Thinking (A3); GE Mathematics/Quantitative Reasoning (B4) requirements, or consent of the instructor.
Typically Offered: Fall and spring
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 the new technologies. 3 hours discussion. (001140)
General Education: Upper-Division Scientific Inq/Quant Reason (UBD); Equity, Ethics, and Policy Pathway; Science, Technology, and Society Pathway
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

BIOL 311W  Pandemics, Germs, and Society (W)  3 Units GE, W, GW
Prerequisite: GE Oral Communication (A1); GE Written Communication (A2); GE Critical Thinking (A3); GE Life Sciences (B2); GE Mathematics/Quantitative Reasoning (B4) requirements, or consent of the instructor.
Typically Offered: Fall and spring
This course provides students with a general overview of microbes (bacteria, fungi, viruses) before introducing concepts related to 1) how novel pathogens emerge to cause pandemics, 2) the science of vaccines and information literacy related to making wise decisions about vaccination, and 3) how public health measures are implemented to restrict the spread of pathogens. In addition, students become familiar with the beneficial uses of microbes and their metabolites in agriculture, nutrition, and sustainable energy. 3 hours lecture. (022232)
General Education: Upper-Division Scientific Inq/Quant Reason (UBD); Health and Wellness Pathway
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division; Writing Course; Graduation Writing Assessment

BIOL 318  Biology of Childhood  3 Units GE
Prerequisite: One biological sciences course; GE Oral Communication (A1); GE Written Communication (A2); GE Critical Thinking (A3); GE Mathematics/Quantitative Reasoning (B4) requirements, or consent of the instructor.
Typically Offered: Fall and spring
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. 3 hours discussion. (001151)
General Education: Upper-Division Scientific Inq/Quant Reason (UBD); Health and Wellness Pathway
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division
<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
<th>GE</th>
<th>W</th>
<th>GW</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 322W</td>
<td>Science and Human Values (W)</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOL 323</td>
<td>Biology of Sex</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOL 330</td>
<td>California Wild Foraging</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOL 334</td>
<td>Conservation Ecology</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOL 345</td>
<td>Health and Lifestyle Diseases</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOL 350W</td>
<td>Fundamentals of Ecology (W)</td>
<td>3</td>
<td>W, GW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOL 360</td>
<td>Genetics</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOL 369</td>
<td>Advanced Plant Biology</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Course Attributes:**
- Upper Division
- Sustainable Course
- Writing Course

**Typically Offered:**
- Fall and spring

**Prerequisite:**
- One biological sciences course; GE Oral Communication (A1); GE Written Communication (A2); GE Critical Thinking (A3); GE Mathematics/Quantitative Reasoning (B4) requirements, or consent of the instructor.

**Grade Basis:**
- Graded

**Repeatability:**
- You may take this course for a maximum of 3 units
<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Title</th>
<th>Units</th>
<th>Prerequisites</th>
<th>Typically Offered</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 370</td>
<td>Advanced Zoology</td>
<td>3</td>
<td>BIOL 161, BIOL 162, and BIOL 163, or faculty permission.</td>
<td>Spring only</td>
<td>Advanced study of animal anatomy, morphology, physiology, ecology, and evolution. 3 hours laboratory, 2 hours lecture. (020281)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Grade Basis: Graded</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Repeatability: You may take this course for a maximum of 3 units</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Course Attributes: Upper Division</td>
</tr>
<tr>
<td>BIOL 371W</td>
<td>Microbiology (W)</td>
<td>4</td>
<td>GE Written Communication (A2) requirement; BIOL 161, BIOL 162, BIOL 163, or faculty permission.</td>
<td>Fall and spring</td>
<td>Introduction to the biology of prokaryotic and eukaryotic microorganisms, as well as viruses. Topics include cell structure, metabolism, genetics; ecological interactions; pathogenic mechanisms; and the roles of microorganisms in sanitation, food production, and biotechnology. The lab focuses on methods for growing and studying diverse microbes. 6 hours laboratory, 2 hours lecture. (020279)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Grade Basis: Graded</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Repeatability: You may take this course for a maximum of 4 units</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Course Attributes: Upper Division; Writing Course; Graduation Writing Assessment</td>
</tr>
<tr>
<td>BIOL 389</td>
<td>Clin Laboratory Observation</td>
<td>1</td>
<td></td>
<td></td>
<td>Students observe in a clinical hospital laboratory and in a private clinical laboratory. 1 hour discussion. (001161)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Grade Basis: Credit/No Credit</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Repeatability: You may take this course for a maximum of 15 units</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Course Attributes: Upper Division</td>
</tr>
<tr>
<td>BIOL 398</td>
<td>Special Topics</td>
<td>1-3</td>
<td></td>
<td></td>
<td>This course is for special topics offered for 1.0-3.0 units. 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. 3 hours discussion. (001166)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Grade Basis: Graded</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Repeatability: You may take this course more than once</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Course Attributes: Upper Division</td>
</tr>
<tr>
<td>BIOL 399</td>
<td>Special Problems</td>
<td>1-3</td>
<td></td>
<td></td>
<td>This course is an independent study of special problems offered for 1.0-3.0 units. 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. 9 hours supervision. (001167)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Grade Basis: Credit/No Credit</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Repeatability: You may take this course for a maximum of 6 units</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Course Attributes: Upper Division</td>
</tr>
<tr>
<td>BIOL 402</td>
<td>Microbial Ecology</td>
<td>4</td>
<td>BIOL 161. Recommended: BIOL 371W.</td>
<td>Fall only</td>
<td>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 hours laboratory, 3 hours lecture. (001225)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Grade Basis: Graded</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Repeatability: You may take this course for a maximum of 4 units</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Course Attributes: Upper Division</td>
</tr>
<tr>
<td>BIOL 404</td>
<td>Aquatic Ecology</td>
<td>4</td>
<td>BIOL 161, CHEM 112.</td>
<td>Fall only</td>
<td>Physical, chemical, and biological factors influencing the ecology of inland waters. 3 hours laboratory, 3 hours lecture. (001207)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Grade Basis: Graded</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Repeatability: You may take this course for a maximum of 4 units</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Course Attributes: Upper Division; Sustainable Course</td>
</tr>
<tr>
<td>BIOL 408</td>
<td>Principles of Evolution</td>
<td>3</td>
<td>BIOL 360.</td>
<td>Fall only</td>
<td>A detailed study of the evolutionary process, including history, natural selection, population genetics, molecular evolution, speciation, coevolution, and macroevolution. 3 hours discussion. (001201)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Grade Basis: Graded</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Repeatability: You may take this course for a maximum of 4 units</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Course Attributes: Upper Division</td>
</tr>
<tr>
<td>BIOL 409</td>
<td>Molecular Biology</td>
<td>4</td>
<td>BIOL 163, BIOL 360.</td>
<td>Spring only</td>
<td>Detailed analysis of structure and related functions of cells with an emphasis on the molecular mechanisms of gene expression and gene regulation. Lectures and laboratory sessions focus on current theories and methodologies associated with cloning, nucleic acid analysis, gene expression, bioinformatics, and genomics. 6 hours laboratory, 2 hours lecture. (020282)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Grade Basis: Graded</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Repeatability: You may take this course for a maximum of 3 units</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Course Attributes: Upper Division</td>
</tr>
<tr>
<td>BIOL 411</td>
<td>Cell Biology</td>
<td>4</td>
<td>BIOL 163, BIOL 360.</td>
<td>Fall only</td>
<td>Detailed study of cellular function with an emphasis on intracellular and intercellular communication. Topics include protein structure and function, properties of biological membranes, signal transduction, protein trafficking pathways, vesicular transport, cell cycle, apoptosis, and cancer. 3 hours discussion, 3 hours laboratory. (001169)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Grade Basis: Graded</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Repeatability: You may take this course for a maximum of 4 units</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Course Attributes: Upper Division</td>
</tr>
<tr>
<td>BIOL 412W</td>
<td>Bacterial Physiology (W)</td>
<td>4</td>
<td>GE Written Communication (A2) requirement; BIOL 360, BIOL 371W, CHEM 370.</td>
<td>Spring only</td>
<td>Study of bacterial structure and function, modes of metabolism, regulatory responses to environmental change and stress, and microbial aspects of nutrition and growth. 2 hours discussion, 6 hours laboratory. (001222)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Grade Basis: Graded</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Repeatability: You may take this course for a maximum of 4 units</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Course Attributes: Upper Division; Writing Course; Graduation Writing Assessment</td>
</tr>
</tbody>
</table>
BIOL 414 Plant Physiology  
Prerequisite: BIOL 163 or SCED 102; CHEM 108 or CHEM 270; or faculty permission.  
Typically Offered: Spring only  
Explanation of the anatomical similarities and differences of selected plants. 3 hours discussion, 3 hours laboratory.  
Grade Basis: Graded  
Repeatability: You may take this course for a maximum of 4 units  
Course Attributes: Upper Division

BIOL 416 Vertebrate Physiology  
Prerequisite: BIOL 162, BIOL 163; CHEM 108 or CHEM 270.  
Typically Offered: Fall and spring  
General features of vertebrate physiology. Function of muscular, nervous, respiratory, circulatory, excretory, and endocrine systems. 2 hours discussion, 6 hours laboratory.  
Grade Basis: Graded  
Repeatability: You may take this course for a maximum of 4 units  
Course Attributes: Upper Division

BIOL 418 Neurophysiology  
Prerequisite: BIOL 161, BIOL 163; CHEM 108 or CHEM 270.  
Typically Offered: Spring only  
This course provides students with background and fundamental information necessary to pursue neuroscience at the graduate or professional level. Cellular and molecular mechanisms within mammalian central nervous system are emphasized. 3 hours laboratory, 3 hours lecture.  
Grade Basis: Graded  
Repeatability: You may take this course for a maximum of 4 units  
Course Attributes: Upper Division

BIOL 422 General Entomology  
Prerequisite: BIOL 161 or faculty permission. Recommended: BIOL 163.  
Typically Offered: Spring only  
The morphology, ecology, and physiology of insects. Economic entomology and medical entomology, and taxonomy. 2 hours discussion, 6 hours laboratory.  
Grade Basis: Graded  
Repeatability: You may take this course for a maximum of 4 units  
Course Attributes: Upper Division

BIOL 425 Developmental Biology  
Prerequisite: BIOL 161, BIOL 163; or faculty permission.  
Typically Offered: Fall only  
Principles and theories of animal development, emphasizing the vertebrate. 3 hours discussion, 3 hours laboratory.  
Grade Basis: Graded  
Repeatability: You may take this course for a maximum of 4 units  
Course Attributes: Upper Division

BIOL 428 Animal Behavior  
Prerequisite: BIOL 163.  
Typically Offered: Fall only odd years  
Consideration of the basic problems in animal behavior, including orientation, social behavior, and the nature and organization of animal societies. 2 hours discussion, 3 hours laboratory.  
Grade Basis: Graded  
Repeatability: You may take this course for a maximum of 3 units  
Course Attributes: Upper Division

BIOL 430 Comparative Anatomy of the Vertebrates  
Prerequisite: BIOL 161, BIOL 163.  
Typically Offered: Fall only odd years  
Explanation of the anatomical similarities and differences of selected vertebrates. The evolution and adaptive significance of various systems are considered. 2 hours discussion, 6 hours laboratory.  
Grade Basis: Graded  
Repeatability: You may take this course for a maximum of 4 units  
Course Attributes: Upper Division

BIOL 432 Biology of Fishes  
Prerequisite: BIOL 161.  
Typically Offered: Fall only odd years  
Morphology, ecology, behavior, and systematics of California fishes, with an introduction to fisheries biology. 3 hours discussion, 3 hours laboratory.  
Grade Basis: Graded  
Repeatability: You may take this course for a maximum of 4 units  
Course Attributes: Upper Division

BIOL 433 Herpetology  
Prerequisite: BIOL 161.  
Typically Offered: Spring only even years  
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 hours laboratory, 3 hours lecture.  
Grade Basis: Graded  
Repeatability: You may take this course for a maximum of 4 units  
Course Attributes: Upper Division

BIOL 434 Ornithology  
Prerequisite: BIOL 161, BIOL 163.  
Typically Offered: Spring only even years  
The morphology, evolution, physiology, ecology, behavior, and taxonomy of birds, including field studies of local species. 2 hours discussion, 6 hours laboratory.  
Grade Basis: Graded  
Repeatability: You may take this course for a maximum of 4 units  
Course Attributes: Upper Division

BIOL 435 Mammalogy  
Prerequisite: BIOL 161.  
Typically Offered: Fall only  
Study of evolution, anatomy, physiology, ecology, and behavior of mammals. California mammals will be emphasized in lab. 2 hours discussion, 3 hours laboratory.  
Grade Basis: Graded  
Repeatability: You may take this course for a maximum of 3 units  
Course Attributes: Upper Division

BIOL 436 Waterfowl Biology  
Typically Offered: Fall only  
This lecture, lab, and field course exposes students to the evolution, ecology, morphology, classification, and identification of North American waterfowl. Additionally, this course has a strong hands-on wetland management component, as well as extensive exposure to the primary literature. 3 hours laboratory, 2 hours lecture.  
Grade Basis: Graded  
Repeatability: You may take this course for a maximum of 3 units  
Course Attributes: Upper Division
BIOI 442 Plant Morphology
Prerequisite: BIOL 163.
Typically Offered: Fall only odd years
Comparative morphology of plant types, emphasizing evolution of structures and methods of reproduction. 3 hours discussion, 3 hours laboratory. (001191)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Upper Division

BIOI 446 Plant Pathology
Prerequisite: BIOL 163 or PSSC 101 or faculty permission.
Typically Offered: Fall only
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 hours laboratory, 3 hours lecture. (001194)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Upper Division

BIOI 448 Plant Diversity and Identification
Prerequisite: BIOL 161 or faculty permission.
Typically Offered: Spring only
Principles of plant classification with field study of local flora, emphasizing the higher plants and their phylogenetic relationships. 2 hours discussion, 6 hours laboratory. (001198)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Upper Division

BIOI 451 Plant Geography
Prerequisite: BIOL 161, BIOL 369.
Typically Offered: Fall only even years
The composition and distribution of plant communities, emphasizing the ecological, environmental, and evolutionary processes that affect them. 3 hours laboratory, 2 hours lecture. (020283)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

BIOI 460 Histology
Prerequisite: BIOL 161, BIOL 163.
Typically Offered: Spring only odd years
Microscopic analysis of tissues, organs, and organ systems of vertebrates emphasizing mammalian histophysiology. 3 hours discussion, 3 hours laboratory. (001170)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Upper Division

BIOI 462 Hematology
Prerequisite: BIOL 163. Recommended: CHEM 270.
Typically Offered: Fall and spring
The study of blood in normal and abnormal conditions. 2 hours discussion, 3 hours laboratory. (001174)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

BIOI 466 Immunology
Prerequisite: BIOL 163.
Typically Offered: Spring only
The development and expression of the immune response, the basic principles of antigen-antibody reactions and their relevance to medicine, genetics, taxonomy, and evolution. 3 hours discussion, 3 hours laboratory. (001220)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Upper Division

BIOI 470W Medical Bacteriology (W)
Prerequisite: GE Written Communication (A2) requirement; BIOL 371W, CHEM 270.
Typically Offered: Fall only
Immunization against tetanus and diphtheria required. Biological characteristics of medically important bacteria. Mechanisms of pathogenicity and host-resistance. Laboratory procedures for isolation and identification. 3 hours discussion, 6 hours laboratory. (001182)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 5 units
Course Attributes: Upper Division; Writing Course; Graduation Writing Assessment

BIOI 472 Microbial Genetics
Prerequisite: BIOL 162. Recommended: BIOL 360 and BIOL 371W.
Typically Offered: Fall only
The molecular basis of mutation and recombination, mechanisms of gene transfer, transcription in bacteria and bacteriophages, genetics and biochemistry of regulation of bacterial operons, and bacteriophage development, and recombinant DNA application to genetic engineering. 3 hours discussion, 3 hours laboratory. (001224)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Upper Division

BIOI 476 General Virology
Prerequisite: BIOL 162, BIOL 371W. Recommended: BIOL 360.
Typically Offered: Spring only
The physical, chemical, and biological properties of bacteria and animal viruses, and their interactions with the host at cellular and organismic levels. 3 hours discussion, 3 hours laboratory. (001185)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Upper Division

BIOI 482 Bioinformatics for Biologists
Prerequisite: BIOL 360, MATH 315.
Typically Offered: Spring only
This is an introduction to some of the bioinformatics techniques and programs commonly used by biologists to analyze large datasets such as the human genome, microbiomes, proteomic datasets, etc. While not requiring any programming experience, this course includes writing simple queries using SQL and basic programming using Perl scripts. 3 hours laboratory, 3 hours lecture. (021658)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Upper Division
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
<th>Prerequisite</th>
<th>Typical Offered</th>
<th>Grade Basis</th>
<th>Repeatability</th>
<th>Grade Basis</th>
<th>Course Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 484W</td>
<td>Field Ecology (W)</td>
<td>3</td>
<td>GE Written Communication (A2)</td>
<td>Spring only</td>
<td>Graduated</td>
<td>You may take this course for a maximum of 3 units</td>
<td>Graduated</td>
<td>Upper Division</td>
</tr>
<tr>
<td>BIOL 489</td>
<td>Internship in Biology</td>
<td>1-3</td>
<td>BIOL 492</td>
<td>Fall and spring</td>
<td>Credit/No Credit</td>
<td>You may take this course for a maximum of 15 units</td>
<td>Credit/No Credit</td>
<td>Upper Division</td>
</tr>
<tr>
<td>BIOL 490</td>
<td>Peer Mentoring in the Biological Sciences</td>
<td>2</td>
<td>BIOL 499H, BIOL 499H, BIOL 697, or BIOL 699T.</td>
<td>Fall and spring</td>
<td>Credit/No Credit</td>
<td>You may take this course for a maximum of 6 units</td>
<td>Credit/No Credit</td>
<td>Upper Division</td>
</tr>
<tr>
<td>BIOL 492</td>
<td>Seminars in Biological Science</td>
<td>1</td>
<td>BIOL 161</td>
<td>Fall only</td>
<td>Credit/No Credit</td>
<td>You may take this course for a maximum of 4 units</td>
<td>Credit/No Credit</td>
<td>Upper Division</td>
</tr>
<tr>
<td>BIOL 494</td>
<td>Senior Seminar in Biology</td>
<td>1</td>
<td>BIOL 399, BIOL 499H, BIOL 697, or BIOL 699T.</td>
<td>Spring only</td>
<td>Credit/No Credit</td>
<td>You may take this course for a maximum of 2 units</td>
<td>Credit/No Credit</td>
<td>Graduate Division</td>
</tr>
<tr>
<td>BIOL 495</td>
<td>Science Teaching Experience</td>
<td>1</td>
<td>BIOL 161, BIOL 350W.</td>
<td>Fall and spring</td>
<td>Graded</td>
<td>You may take this course for a maximum of 15 units</td>
<td>Graded</td>
<td>Upper Division</td>
</tr>
<tr>
<td>BIOL 498</td>
<td>Special Topics</td>
<td>1-4</td>
<td>BIOL 492</td>
<td>Fall and spring</td>
<td>Credit/No Credit</td>
<td>You may take this course more than once</td>
<td>Credit/No Credit</td>
<td>Upper Division</td>
</tr>
<tr>
<td>BIOL 499</td>
<td>Special Problems</td>
<td>1-3</td>
<td>BIOL 492</td>
<td>Fall and spring</td>
<td>Credit/No Credit</td>
<td>You may take this course for a maximum of 6 units</td>
<td>Credit/No Credit</td>
<td>Upper Division</td>
</tr>
<tr>
<td>BIOL 499H</td>
<td>Honors Research in Biological Sciences</td>
<td>3-6</td>
<td>Admission into the graduate program in biology or botany.</td>
<td>Fall and spring</td>
<td>Graded</td>
<td>You may take this course for a maximum of 6 units</td>
<td>Graded</td>
<td>Upper Division</td>
</tr>
<tr>
<td>BIOL 600</td>
<td>Research in Biological Sciences</td>
<td>3</td>
<td>BIOL 499H, BIOL 499H, BIOL 697, or BIOL 699T.</td>
<td>Fall only</td>
<td>Graded</td>
<td>You may take this course for a maximum of 3 units</td>
<td>Graded</td>
<td>Graduate Division</td>
</tr>
<tr>
<td>BIOL 601</td>
<td>Scientific Presentations</td>
<td>2</td>
<td>BIOL 399, BIOL 499H, BIOL 697, or BIOL 699T.</td>
<td>Spring only</td>
<td>Graded</td>
<td>You may take this course for a maximum of 2 units</td>
<td>Graded</td>
<td>Graduate Division</td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Units</td>
<td>Prerequisite</td>
<td>Typically Offered</td>
<td>Course Attributes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>--------------------------------------------------</td>
<td>---------</td>
<td>------------------------------------------------------------------------------</td>
<td>----------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOL 602</td>
<td>Scientific Writing</td>
<td>2 Units</td>
<td>BIOL 409 or CHEM 451.</td>
<td>Fall and spring</td>
<td>Graduate Division</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOL 605</td>
<td>Biological Seminar</td>
<td>1 Unit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOL 609</td>
<td>Advanced Cellular/Molecular Biology</td>
<td>4 Units</td>
<td>BIOL 609 or BIOL 411 or BIOL 414</td>
<td>Spring only</td>
<td>Graduate Division</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOL 610</td>
<td>Topics in Cell/Molecular Biology</td>
<td>1-3 Units</td>
<td>BIOL 609.</td>
<td>Spring only</td>
<td>Graduate Division</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOL 611</td>
<td>Advanced Physiology/Cell Biology</td>
<td>4 Units</td>
<td>BIOL 411 or BIOL 414 or BIOL 416.</td>
<td>Fall only odd years</td>
<td>Graduate Division</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOL 612</td>
<td>Topics in Physiological/Developmental Biology</td>
<td>1-3 Units</td>
<td>BIOL 611.</td>
<td>Inquire at department</td>
<td>Graduate Division; Sustainable Course</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOL 613</td>
<td>Population Ecology</td>
<td>4 Units</td>
<td>BIOL 350W.</td>
<td>Spring only even years</td>
<td>Graduate Division; Sustainable Course</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOL 614</td>
<td>Topics in Ecology and Systematics</td>
<td>1-3 Units</td>
<td>BIOL 350W.</td>
<td>Fall only even years</td>
<td>Graduate Division; Sustainable Course</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOL 616</td>
<td>Foundations of Ecology</td>
<td>3 Units</td>
<td></td>
<td>Fall only</td>
<td>Graduate Division</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOL 617</td>
<td>Foundations of Evolutionary Biology</td>
<td>3 Units</td>
<td></td>
<td>Spring only</td>
<td>Graduate Division</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOL 668</td>
<td>Community and Ecosystem Ecology</td>
<td>3 Units</td>
<td></td>
<td>Spring only even years</td>
<td>Graduate Division; Sustainable Course</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
BIOL 672  Plant Ecology 4 Units
Prerequisite: BIOL 350W, BIOL 448, graduate standing.
Typically Offered: Spring only odd years
Autecology, emphasizing California vascular plants, with focus on current
topics in behavioral and reproductive ecology. Field project work and
detailed literature survey. 6 hours laboratory, 2 hours seminar. (001299)
Grade Basis: Graduate Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Graduate Division; Sustainable Course

BIOL 692  Advanced Biology Seminar Series 1 Unit
Typically Offered: Fall and spring
Experts in various fields of Biology present their research each week.
Following each presentation students are required to write a paper that
summarizes and critiques the presentation. 1 hour lecture. (021960)
Grade Basis: Graduate Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Graduate Division

BIOL 697  Independent Study 1-4 Units
Typically Offered: Fall and spring
This course is a graduate-level independent study. You must register
directly with a supervising faculty member. Survey and careful study of
literature, experimentation, observation, and collection of data in field and
laboratory. 9 hours supervision. (001319)
Grade Basis: Report in Progress: Graded
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Graduate Division

BIOL 699P  Master's Project 1-6 Units
Prerequisite: Faculty permission.
Typically Offered: Inquire at department
This course is a master's project offered for 1.0-6.0 units. You
must register directly with a supervising faculty member. 0 hours
supervision. (022562)
Grade Basis: Report in Progress: CR/NC
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Graduate Division

BIOL 699T  Master's Thesis 1-6 Units
Typically Offered: Fall and spring
This course is a master's study offered for 1.0-6.0 units. You
must register directly with a supervising faculty member. 3 hours
supervision. (001320)
Grade Basis: Report in Progress: CR/NC
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Graduate Division