

**Biology  
Field Ecology**

**BIOL**

**Degree:**

- A.S. – Biology
- AS-T – Biology for Transfer

**Certificate of Achievement:  
Field Ecology**

**Division of Science and Allied Health**  
**James Collins, Dean**  
**South Gym, room 220**  
**916-558-2271**

**Biology  
Associate in Science Degree**

**Program Information**

The major is designed to meet some of the common lower-division requirements for a major in Biology.

For Students who plan to transfer, completion of the CSU General-Breadth or IGETC general education pattern is encouraged. It is highly recommended that students meet with a counselor because major and general education requirements vary for each college/university. These courses also fulfill general education requirements for allied health, biological sciences, physical sciences, computer science, and engineering.

**Career Opportunities**

Biologists work as laboratory technologists, x-ray and respiratory technologists, physical therapists, physicians, nurses, and researchers in the medical field; as foresters, wildlife and fisheries biologists, field ecologists, ethnobiologists, botanists, entomologists, and others in field biology and ecology; as veterinary technicians, researchers, and doctors in veterinary medicine; as agronomists, plant pathologists, enologists, and pest management specialists in agriculture; as educators in K-12 schools, community colleges, and universities; and in many other careers.

Note: Students planning to transfer to four-year institutions are advised to meet with a counselor for general education requirements.

**Upon completion of this program, the student will be able to:**

- use the scientific method to pose questions and test hypotheses about the natural world.
- evaluate the design, analysis, and interpretation of scientific experiments.
- demonstrate an understanding of the process of biological evolution by the mechanism of natural selection.
- use and understand biological laboratory techniques and safety protocols.
- recognize and define a core set of biological terms and principles.
- compile and analyze data generated through experimentation.

**Required Program**

**Units**

CHEM 400 General Chemistry (5) ..... 5  
 or CHEM 305 Introduction to Chemistry (5)

A minimum of 10 units from the following:..... 10

- BIOL 402 Cell and Molecular Biology (5)
- BIOL 412 Plant Biology (5)
- BIOL 422 Animal Biology (5)
- BIOL 440 General Microbiology (4)
- BIOL 430 Anatomy and Physiology (5)
- BIOL 431 Anatomy and Physiology (5)

A minimum of 8 units from the following: ..... 8<sup>1</sup>

- BIOL 100 Introduction to Concepts of Human Anatomy and Physiology (3)
- BIOL 305 Natural History (4)
- BIOL 308 Contemporary Biology (3)
- BIOL 309 Contemporary Biology Laboratory (1)
- BIOL 320 Field Botany (3)
- BIOL 330 Introduction to Entomology (3)
- BIOL 342 The New Plagues: New and Ancient Infectious Diseases Threatening World Health (3)

- BIOL 350 Environmental Biology (3)
- BIOL 360 Environmental Regulations (3)
- BIOL 362 Field Methods in Ecology (3)
- BIOL 364 Restoration Ecology (2)
- BIOL 370 Marine Biology (4)
- BIOL 402 Cell and Molecular Biology (5)
- BIOL 412 Plant Biology (5)
- BIOL 422 Animal Biology (5)
- BIOL 430 Anatomy and Physiology (5)
- BIOL 431 Anatomy and Physiology (5)
- BIOL 434 Pathology: The Study of Disease (3)
- BIOL 440 General Microbiology (4)
- BIOL 314 Dinosaurs and the Science of Life (3)
- BIOL 315 Dinosaurs and the Science of Life Laboratory (1)
- BIOL 326 Ethnobotany (3)
- BIOL 327 Ethnobotany Laboratory (1)

**Total Units Required**

**23**

<sup>1</sup>NOTE: Any of these courses may be taken to meet additional units required for electives.

**Associate in Science (A.S.) Degree**

The Associate in Science Degree may be obtained by completion of the required program, plus general education requirements, plus sufficient electives to meet a 60-unit total. See SCC graduation requirements.



**Associate Degree  
for Transfer**  
*A Degree with a Guarantee.*

**Biology**

**Associate in Science for Transfer**

**Program Information**

The Associate in Science in Biology for Transfer degree is designed to prepare students for transfer to a baccalaureate degree program at the California State University in biology or the biological sciences, including molecular biology, cell biology, marine biology, botany, zoology, ecology, environmental science, evolution, genetics, microbiology, and agricultural science. Upon completion of the Associate in Science in Biology for Transfer, students will seamlessly transfer with junior standing to the California State University system.

The Associate Degree for Transfer (ADT) student completion requirements (as stated in SB1440 law):

- (1) Completion of a minimum of 60 semester units or 90 quarter units that are eligible for transfer to the California State University, including both of the following:
  - (A) The Intersegmental GE Transfer Curriculum (IGETC) or the California State University General Education-Breadth Requirements (CSU GE-B).
  - (B) A minimum of 18 semester units or 27 quarter units in a major or area of emphasis, as determined by the community college district.
- (2) Obtainment of a minimum grade point average of 2.0.

ADTs also require that students earn a “C” or better in all courses required for the major or area of emphasis.

The Associate in Science in Biology for Transfer degree is intended specifically for students planning to transfer to a California State University. It is critical for all students to meet with an SCC counselor and to consult with the transfer institution to determine if any university program is impacted or has additional pre-transfer requirements. Completion of the Associate in Science in Biology for Transfer degree may not prepare students to transfer to the University of California or other colleges or universities offering a degree in biology or in the biological sciences, as these baccalaureate degree programs may have different requirements. If a student intends to transfer to the University of California, additional courses in chemistry, physics, and math may be required.

**Career Opportunities**

Biologists work as laboratory technologists, x-ray and respiratory technologists, physical therapists, physicians, nurses, and researchers in the medical field; as foresters, wildlife and fisheries biologists, field ecologists, ethnobiologists, botanists, entomologists, and others in field biology and ecology; as veterinary technicians, researchers, and doctors in veterinary medicine; as agronomists, plant pathologists, enologists, and pest management specialists in agriculture; as educators in K-12 schools, community colleges, and universities; and in many other careers.

**Upon completion of this program, the student will be able to:**

- apply the scientific method to pose questions and test hypotheses about the natural world.
- evaluate the design, analysis, and interpretation of scientific experiments.
- successfully perform biological laboratory techniques, including microscopy, and understand laboratory safety protocols.
- define and correctly use a core set of scientific terminology relevant to biological organisms and principles.
- write clear, well organized essays or research papers that demonstrate the ability to integrate the chemical, cellular, organismal, population, and ecosystem levels of biological organization into explanations of biological processes.
- demonstrate an understanding of biological evolution by explaining the diversity and unity of life in terms of evolutionary mechanisms including natural selection.
- apply biological principles to successfully complete upper division coursework in general biology, cell biology, molecular biology, genetics, botany, zoology, marine biology, anatomy, physiology, ecology, and evolution.
- apply the process of science and scientific skills in order to successfully participate in supervised research in a biological science.

**Required Program**

	<b>Units</b>
BIOL 402 Cell and Molecular Biology .....	5
BIOL 412 Plant Biology .....	5
BIOL 422 Animal Biology .....	5
CHEM 400 General Chemistry I .....	5
CHEM 401 General Chemistry II .....	5
MATH 350 Calculus for the Life and Social Sciences I .....	3
PHYS 350 General Physics .....	4
PHYS 360 General Physics .....	4
PSYC 300 General Principles (3).....	3
or PSYC 480 Honors General Principles (3)	
<b>Total Units Required</b>	<b>39</b>

**Associate in Science for Transfer Degree**

The Associate in Science in Biology for Transfer (AS-T) degree may be obtained by completion of 60 transferable, semester units with a minimum 2.0 GPA, including (a) the major or area of emphasis described in the Required Program, and (b) either the Intersegmental General Education Transfer Curriculum (IGETC) or the California State University General Education-Breadth Requirements.

**Field Ecology**

**Certificate of Achievement**

**Program Information**

The Field Ecology Certificate program provides the training and education necessary to succeed in government agencies, private businesses, and non-profits that provide field ecology services. The certificate provides the opportunity to learn ecological field methods including identification of flora and fauna, quantitative assessment methods, wetland delineations, regulatory processes, restoration ecology, and geographic information systems. In addition to field methods, students will receive education in general ecological principles.

Two pathways to obtain the certificate exist for this program (students will choose only one of these pathways). Both pathways require the same core courses and only vary in their elective components. One pathway (Pathway 1) is oriented toward students pursuing their Associate in Science degree in Biology and allows use of either BIOL 412 (Plant Biology) or BIOL 422 (Animal Biology) to partially meet unit requirements for elective courses in the program. The second pathway (Pathway 2) is oriented toward students not pursuing their Biology degree, and unit requirements for elective courses are entirely obtained from the list of elective courses in the program.

**Career Opportunities**

The Field Ecology Certificate can fulfill the needs of agencies and private businesses, and non-profits for entry-level ecological and environmental technicians and field biologists. Entry-level jobs can be found in government resource agencies at the federal, state, and local levels and in private environmental consulting businesses and private non-profit environmental organizations. This certificate program will provide advancement opportunities to those currently employed in the environmental and resource professions. In addition to updating job skills, this certificate will provide new training and education opportunities for returning and continuing students.

**Gainful Employment**

For more information about program costs, graduation rates, median debt of program graduates, and other important information regarding gainful employment, please visit: <http://www.losrios.edu/gainful-emp-info/gedt.php?major=051401C01>

**Upon completion of this program, the student will be able to:**

- describe the basic principles of ecology, particularly in the context of field oriented biology.
- identify flora and fauna of the region.
- assess ecosystem evaluation methods and demonstrate competence in ecosystem analysis methodologies.
- examine the regulatory processes and agencies involved with environmental regulations at the local, state, and federal levels.
- apply the evolutionary process to its role in ecosystems.
- collect biological and ecological data during field work opportunities.
- record data in a field notebook and on data sheets.
- operate equipment used for the field work component of the program (e.g. nets and other collecting equipment for fishery surveys, nets and sorting trays associated with benthic macro invertebrate surveys for rapid bioassessment, and soil extraction tools for assessment of wetland hydric soils.)
- analyze data collected during field experiments and investigations (e.g. fishery data collected from captured species, percentages of cover of native and non-native plant species from an experimental vegetation plot, determination of water quality characteristics based on sensitivities of benthic macro invertebrate taxonomic units).
- formulate strategies and methodologies for data collection in various field situations.

**Required Program**

	<b>Units</b>
BIOL 305 Natural History .....	4
BIOL 320 Field Botany .....	3
BIOL 360 Environmental Regulations .....	3
BIOL 362 Field Methods in Ecology .....	4
<b>Subtotal Units:</b>	<b>14</b>

**Pathway 1 (For students also pursuing an Associate in Science Degree in Biology)**

BIOL 412 Plant Biology (5).....	5
or BIOL 422 Animal Biology (5)	
A minimum of 5 units from the following:.....	5
BIOL 321 Advanced Field Botany (3)	
BIOL 326 Ethnobotany (3)	
BIOL 327 Ethnobotany Laboratory (1)	
BIOL 330 Introduction to Entomology (3)	
BIOL 332 Introduction to Ornithology (3)	
BIOL 350 Environmental Biology (3)	
BIOL 352 Conservation Biology (3)	
BIOL 364 Restoration Ecology (2)	
BIOL 370 Marine Biology (4)	
BIOLFS 310 Natural History Field Study: Mojave Desert (2)	
BIOLFS 350 Natural History Field Study: Sierra Nevada Plants (2)	
CHEM 320 Environmental Chemistry (4)	
GEOG 330 Introduction to Geographic Information Systems (3)	
GEOG 331 Exploring Maps and Geographic Technologies (3)	
GEOG 334 Introduction to GIS Software Applications (3)	
GEOL 345 Geology of California (3)	
Pathway 1 (For students also pursuing an Associate in Science Degree in Biology) Units: .....	10
<b>Total Units:</b>	<b>24</b>

**Pathway 2 (For students pursuing only the Field Ecology Certificate)**

A minimum of 10 units from the following:.....	10
BIOL 321 Advanced Field Botany (3)	
BIOL 326 Ethnobotany (3)	
BIOL 327 Ethnobotany Laboratory (1)	
BIOL 330 Introduction to Entomology (3)	
BIOL 332 Introduction to Ornithology (3)	
BIOL 350 Environmental Biology (3)	
BIOL 352 Conservation Biology (3)	
BIOL 364 Restoration Ecology (2)	
BIOL 370 Marine Biology (4)	
BIOLFS 310 Natural History Field Study: Mojave Desert (2)	
BIOLFS 350 Natural History Field Study: Sierra Nevada Plants (2)	
CHEM 320 Environmental Chemistry (4)	
GEOG 330 Introduction to Geographic Information Systems (3)	
GEOG 331 Exploring Maps and Geographic Technologies (3)	
GEOG 334 Introduction to GIS Software Applications (3)	
GEOL 345 Geology of California (3)	
Pathway 2 (For students pursuing only the Field Ecology Certificate) Units: .....	10
<b>Total Units Required</b>	<b>24</b>

**Certificate of Achievement**

The Certificate of Achievement may be obtained by completion of the required program with grades of "C" or better.

**Biology (BIOL)**

**BIOL 100 Introduction to Concepts of Human Anatomy and Physiology 3 Units**

*Prerequisite:* None.  
*Advisory:* AH 110 (Medical Language for Health-Care Providers), ENGRD 110 (Efficient Reading) or ESLR 320 (Advanced-Low Reading), and ENGWR 51 (Developmental Writing) or ESLW 310 (Intermediate-High Writing), and BIOL 290 (Science Study Skills) with grades of "C" or better.  
*General Education:* AA/AS Area IV  
*Hours:* 54 hours LEC

This introductory lecture course provides an overview of the basic anatomy and physiology of all 11 body systems and is required for students entering the licensed vocational nursing and occupational therapy assistant programs. It is designed for students having little or no background in the biological sciences. The course is also open to those intending to pursue studies in the biological sciences who need to strengthen or develop a vocabulary in human anatomy and physiology.

**BIOL 290 Science Skills and Applications .5 Units**

*Prerequisite:* None.  
*Corequisite:* Concurrent enrollment in a science course  
*Hours:* 27 hours LAB

This course offers individualized instructional modules designed to provide or improve skills in the various science courses. A partial list of skills may include the following: textbook comprehension, principles of learning and retention, note taking, annotating, discipline-based vocabulary, paraphrasing, reading graphics, test taking, spatial ability, proportionality, and problem solving. Registration is open through the ninth week of the semester. To begin the course any later than that week would not permit completion of course material. This course may be taken one time for credit and is graded Pass/No Pass.

**BIOL 299 Experimental Offering in Biology .5-4 Units**

*Prerequisite:* None  
*Hours:* 72 hours LEC; 27 hours LAB  
 See Experimental Offerings

**BIOL 305 Natural History 4 Units**

*Prerequisite:* None.  
*Advisory:* ENGWR 101 with a grade of "C" or better.  
*General Education:* AA/AS Area IV; CSU Area B2; CSU Area B3; IGETC Area 5B  
*Course Transferable to UC/CSU*  
*Hours:* 54 hours LEC; 54 hours LAB

The course is a survey of ecosystems in California with a special emphasis on the relationships between the species, adaptations of those species to their environment, and general ecological concepts. Students will explore the environment and diversity of organisms occurring in our geographical area but will be able to apply this knowledge to other areas as well. Attending a minimum of one field trip is required. The course is designed for the non-science major and is one of the core courses in the Field Ecology Certificate.

**BIOL 308 Contemporary Biology 3 Units**

*Prerequisite:* None.

*Advisory:* ENGWR 101; with a grade of "C" or better

*General Education:* AA/AS Area IV; CSU Area B2; IGETC Area 5B

*Course Transferable to UC/CSU*

*Hours:* 54 hours LEC

This course is a survey of biological science intended to equip the student to think and act intelligently with respect to contemporary issues in biology. Biological topics are introduced in a framework of natural selection. The course is for those not intending to major in biological sciences, particularly liberal studies majors. Genetics is a significant focus of the course, as are origin of cellular life, cellular physiology, and diversity of organisms. A laboratory illustrating the principles introduced is offered as an optional accompanying course.

**BIOL 309 Contemporary Biology Laboratory 1 Unit**

*Prerequisite:* None.

*Corequisite:* BIOL 308

*General Education:* CSU Area B3; IGETC Area 5B; IGETC Area 5C

*Course Transferable to UC/CSU*

*Hours:* 54 hours LAB

This course is an optional laboratory accompaniment to BIOL 308. The sessions will illustrate biological phenomena and their relationship to contemporary concerns and discoveries in biology.

**BIOL 314 Dinosaurs and the Science of Life 3 Units**

*Prerequisite:* None.

*Advisory:* ENGWR 101 with a grade of "C" or better

*General Education:* AA/AS Area IV; CSU Area B2; IGETC Area 5B

*Course Transferable to UC/CSU*

*Hours:* 54 hours LEC

This course investigates the evolution, form, function, and extinction of dinosaurs as a means of introducing students to scientific principles that are common to all forms of life on Earth. Topics will include scientific methodology; the mechanisms of evolution; the structure, early history, and geologic processes of the Earth; the evolutionary history of life on Earth; the diversity, ecology, physiology and behavior of dinosaurs; birds as dinosaurs. Additional topics will include proposed mechanisms of dinosaur extinction including meteorite impacts, volcanic plume events, global winters, global climate change, acid rain, and how each may occur today; genetics, the structure and function of DNA, cellular reproduction, cloning and stem cell technologies and whether they can be used to resurrect extinct organisms such as dinosaurs. This course was formerly designated BIOL 464, and may not be taken by students who have completed BIOL 464.

**BIOL 315 Dinosaurs and the Science of Life Laboratory 1 Unit**

*Prerequisite:* None.

*Corequisite:* BIOL 314 or prior completion of BIOL 314 or BIOL 464 with a grade of "C" or better.

*Advisory:* ENGWR 101 with a grade of "C" or better

*Course Transferable to UC/CSU*

*Hours:* 54 hours LAB

This course is an optional laboratory component to accompany BIOL 314 (formerly BIOL 464). The laboratory sessions will allow students to engage in hands-on investigations to broaden and deepen their understanding of concepts discussed and developed in BIOL 314. Students may take this course either concurrently with or any time after completion of BIOL 314 or BIOL 464. Formerly BIOL 465, this course may not be taken by students who have completed BIOL 465.

**BIOL 320 Field Botany 3 Units**

*Prerequisite:* None.

*Advisory:* ENGWR 101 with a grade of "C" or better.

*General Education:* AA/AS Area IV

*Course Transferable to CSU*

*Hours:* 36 hours LEC; 54 hours LAB

This course is designed for both science and nonscience students to learn about plant taxonomy. Students will learn about the classification of flowering plants, how to identify plant species, and will become familiar with native plants of California as well as their ecological relationships and historical uses. A plant collection and a minimum of 10 field trips are required. Field trip locations may include Table Mountain, Marin Headlands, vernal pool sites, and other locations where plants can be observed in their natural surroundings.

**BIOL 321 Advanced Field Botany 3 Units**

*Prerequisite:* BIOL 320 with a grade of "C" or better

*Advisory:* ENGWR 101 with a grade of "C" or better

*General Education:* AA/AS Area IV; IGETC Area 4

*Course Transferable to UC/CSU*

*Hours:* 36 hours LEC; 54 hours LAB

This course is designed for both science and non-science students to broaden and deepen their knowledge of plant taxonomy. Students will learn the technical aspects of the dynamic nature of the classification of flowering plants and expand their ability to identify plant families, genera, and species in the field. Students will become familiar with additional native and non-native plants of California as well as their ecological relationships and conservation status. The role of herbaria in the conservation of plant taxa and plant communities will be addressed and students will practice mounting and labeling plant specimens for inclusion in an herbarium collection. A plant collection and a minimum of seven (7) field trips are required. Field trip locations may include Table Mountain, Marin Headlands, Jepson Prairie, Traverse Creek, and other locations where plants can be observed in their natural surroundings.

**BIOL 326 Ethnobotany 3 Units**

*Prerequisite:* None.

*Advisory:* ENGWR 101 (College Writing) with a grade of "C" or better.

*General Education:* AA/AS Area IV; CSU Area B2; IGETC Area 5B

*Course Transferable to UC/CSU*

*Hours:* 54 hours LEC

This introductory lecture course focuses on the concepts, questions, and methods of ethnobotany (the scientific study of the interactions between plants and humans). Students will use the scientific method to investigate the ecological and biological traits of plants, how these traits have shaped multicultural human use, and, in turn, been affected by humans. Topics include plant structure and reproduction, biodiversity and plant evolution in natural and cultivated systems, traditional ecological knowledge and management techniques, ethnobotanical research methods and ethical issues, and a comparison of plant use by various cultures for food, medicine, shelter, basketry, and dyes. Students may be awarded credit for BIOL 323 or BIOL 326, but not for both.

**BIOL 327 Ethnobotany Laboratory 1 Unit**

*Prerequisite:* None.

*Corequisite:* BIOL 326 or prior completion of BIOL 326 with a grade of "C" or better.

*Advisory:* ENGWR 101 with a grade of "C" or better.

*General Education:* AA/AS Area IV; CSU Area B3; IGETC Area 5C

*Course Transferable to UC/CSU*

*Hours:* 54 hours LAB

This introductory laboratory course is designed to be taken after or concurrently with BIOL 326 (Ethnobotany). This course focuses on the concepts, questions, and methods of ethnobotany (the scientific study of the interactions between plants and humans). Students will use the scientific method to investigate the ecological and biological traits of plants, how these traits have shaped multicultural human use, and, in turn, been affected by humans. Topics include plant structure and reproduction, biodiversity and plant evolution in natural and cultivated systems, traditional ecological knowledge and management techniques, ethnobotanical research methods, and investigation of plant use for food, medicine, dyes, shelter, and other uses. Students may be awarded credit for BIOL 323 or BIOL 327, but not for both.

**BIOL 330 Introduction to Entomology 3 Units**

*Prerequisite:* None.

*General Education:* AA/AS Area IV

*Course Transferable to UC/CSU*

*Hours:* 54 hours LEC

This course provides an introduction to the science of entomology. Entomology examines the great diversity of insects, both in numbers as well as their life histories. The course introduces students to the variety found in insects: their structure and functions, their habits, their evolutionary biology, and their significance to humans. In addition, students will learn to identify orders and major families of insects. Due to their diversity and presence in all kinds of environments, insects provide a good framework for making scientific observations and for applying the scientific method to their studies. Attendance on one field trip is required.

**BIOL 332 Introduction to Ornithology 3 Units**

*Prerequisite:* None.

*General Education:* AA/AS Area IV

*Course Transferable to UC/CSU*

*Hours:* 18 hours LEC; 108 hours LAB

This introductory course covers the biology and natural history of birds. Topics include the evolutionary origins of birds and flight, avian physiology and sensory systems, migration, social behavior, reproduction, and conservation. Laboratory work explores bird structure and function and teaches the taxonomic classification and identification of birds, particularly those found in California and the western United States. Field trips (which may include one or two overnight trips) are required; students study bird identification, behavior, and ecology. The cost per student to participate in the overnight trip(s) is approximately \$20-\$45. This course may be used as an elective in the Field Ecology Certificate Program.

**BIOL 342 The New Plagues: New and Ancient Infectious Diseases Threatening World Health 3 Units**

*Prerequisite:* None.

*Advisory:* ENGWR 101 with a grade of "C" or better.

*General Education:* AA/AS Area IV; CSU Area B2; CSU Area E1; IGETC Area 5B

*Course Transferable to UC/CSU*

*Hours:* 54 hours LEC

This course will explore the biology, epidemiology, and pathology of selected pathogenic prions, viruses, bacteria, protozoa, and helminthes threatening public health worldwide. The course will also explore how human behavior and human activities have catalyzed the emergence of new infectious diseases and re-emergence of ancient plagues.

**BIOL 350 Environmental Biology 3 Units**

*Prerequisite:* None.

*General Education:* AA/AS Area IV; CSU Area B2; IGETC Area 5B

*Course Transferable to UC/CSU*

*Hours:* 54 hours LEC

This course provides both biology majors and non-majors with instruction in human interactions with the environment and resolutions to potential conflicts that develop due to this interaction. Understanding how life affects environments and ecosystems is an integral part of the biological sciences. To achieve this understanding, biological and ecological principles are examined as they relate to the natural environment. Major topics include the function and structure of ecosystems and ecological processes, the effects of natural selection on populations, the role of biodiversity on the maintenance of ecosystems, the variety of human impacts on terrestrial, aquatic, and atmospheric systems, potential solutions to adverse impacts, and the application of the scientific method in the examination of these effects. Attendance on one class field trip is required in this course.

**BIOL 351 Global Climate Change 3 Units**

*Prerequisite:* None.

*General Education:* AA/AS Area IV; CSU Area B2; IGETC Area 5B

*Course Transferable to UC/CSU*

*Hours:* 54 hours LEC

This interdisciplinary course explores the natural and human factors causing the Earth's climate to change. Whether alarmed, skeptical, or just curious about climate change, students will acquire the scientific tools to analyze the evidence that climate change is a looming threat. Through lectures, readings, discussions and projects, students will examine the Earth's present and past climates as well as the influence of climate on the geographical distribution of plants, animals and human societies.

**BIOL 352 Conservation Biology 3 Units**

*Prerequisite:* None.

*General Education:* AA/AS Area IV; CSU Area B2; IGETC Area 5B

*Course Transferable to UC/CSU*

*Hours:* 54 hours LEC

This introductory course covers biological and ecological principles involved in understanding and analyzing environmental problems and exploring scientifically sound conservation techniques. Major topics include the nature of science, basic principles of ecology, genetics and evolution, patterns of biodiversity and extinction, and the interdependence between humans and our environment. This course places emphasis on scientific processes and methodology and the application of science to conservation issues. Field trips and/or a semester project may be required.

**BIOL 360 Environmental Regulations 3 Units**

*Prerequisite:* None.

*Advisory:* BIOL 305 and ENGWR 101 with grades of "C" or better.

*Course Transferable to CSU*

*Hours:* 54 hours LEC

This course examines the environmental regulatory process in California. Federal and California environmental laws will be studied and discussed. Relevant Federal regulations include: The National Environmental Policy Act, Federal Endangered Species Act, Marine Mammal Protection Act, Clean Water Act, Clean Air Act, Fish and Wildlife Coordination Act, Coastal Zone Management Act, Resource Conservation and Recover Act, Superfund, and the Rivers and Harbors Act. Relevant California regulations include: California Environmental Quality Act, California Endangered Species Act, California Coastal Act, Natural Communities Conservation Planning process, Streambed Alteration Agreements, and California Water Law. In addition, the jurisdictional wetland delineation process will be studied in detail including field work to demonstrate the process. Students will be introduced to these regulations during lectures and will participate in discussions of the regulatory process. One field trip is required.

**BIOL 362 Field Methods in Ecology 4 Units**

*Prerequisite:* BIOL 305 (Natural History) AND BIOL 320 (Field Botany) or equivalent college-level courses (college-level ecology course with lecture and lab may substitute for BIOL 305; plant taxonomy course using the Jepson Manual may substitute for BIOL 320) with a grade of "C" or better.

*Advisory:* Students must be in good health and be able to hike moderate distances through rough terrain.

*Course Transferable to CSU*

*Hours:* 54 hours LEC; 54 hours LAB

This course is an introduction to methods for sampling and studying a variety of organisms in the field with a particular emphasis on the vegetation, macroinvertebrates, fish, and wildlife of the area. The goals are to gain experience and develop skills in the following areas: identification of plants and animals, first-hand knowledge of a wide array of organism life histories, quantitative field research techniques and procedures applicable to plants and animals, and recording of data and observations in a field notebook. Required field trips (approximately eight) to local and regional habitats focus on seasonally relevant events, processes, and appropriate methodologies to study these communities. Extensive field work is required; therefore, students need to be in appropriate physical condition to successfully navigate uneven ground and withstand adverse weather conditions.

**BIOL 364 Restoration Ecology 2 Units**

*Prerequisite:* None.

*Advisory:* ENGWR 101 with a grade of "C" or better.

*Course Transferable to CSU*

*Hours:* 27 hours LEC; 27 hours LAB

Restoration ecology is the science of creation, management, and perpetuation of wildlife habitat. This course will examine this subject through lectures providing requisite knowledge of principles in ecology, natural selection, and biodiversity. These principles are applied to existing and on-going habitat restoration techniques in the Sacramento area combined with visits to some of these restored areas to observe firsthand the restoration methods, management, and success of the sites. Several field trips to local restoration sites occur during the course.

**BIOL 370 Marine Biology 4 Units**

*Prerequisite:* None.

*Advisory:* ENGWR 101 with a grade of "C" or better.

*General Education:* AA/AS Area IV; CSU Area B2; CSU Area B3; IGETC Area 5B

*Course Transferable to UC/CSU*

*Hours:* 54 hours LEC; 54 hours LAB

This course is an introduction to marine biology and oceanography. It includes the study of marine vertebrates and invertebrates, tide pool and coastal ecology, sea water, tides, currents, marine geology, and coastal processes. Instruction includes both lab and lecture and required field trips to study intertidal plants and animals and coastal ecology. Three field trips are required. Two of these involve tent camping over one two-day and one three-day weekend and will focus on the North and Central California Coast. Students must supply their own food, tents, and sleeping bags. Students are responsible for field trip costs for camping, tours, and parking (approximately \$50 – \$80 per student.) Field trip dates will be announced at the first class meeting.

**BIOL 402 Cell and Molecular Biology 5 Units**

*Prerequisite:* CHEM 400 with a grade of "C" or better

*Advisory:* ENGWR 101 with a grade of "C" or better

*General Education:* AA/AS Area IV; CSU Area B2; CSU Area B3; IGETC Area 5B; IGETC Area 5C

*Course Transferable to UC/CSU*

*Hours:* 54 hours LEC; 108 hours LAB

This is the first semester of a three-semester sequence in general biology designed for biology majors. It is an introduction to many aspects of living cells, with an emphasis on the molecular level of organization. Topics include an introduction to biological molecules, enzymes, cell structure, respiration, photosynthesis, reproduction, genetics, and statistical analysis. The course also covers molecular genetics, structure and function of viruses, DNA technology, and genetic engineering techniques. (C-ID BIOL 190)

**BIOL 412 Plant Biology 5 Units**

*Prerequisite:* BIOL 402 or equivalent course with a grade of "C" or better.

*General Education:* AA/AS Area IV; CSU Area B2; CSU Area B3; IGETC Area 5B; IGETC Area 5C

*Course Transferable to UC/CSU*

*Hours:* 54 hours LEC; 108 hours LAB

This course is part of a three-semester general biology sequence designed for biology majors. BIOL 412 and BIOL 422 may be taken in any order after completion of BIOL 402 with a grade of C or better. BIOL 412 builds upon and applies concepts developed in Cell and Molecular Biology to the study of plants and general ecology. Topics covered include the diversity, taxonomy, and evolutionary trends observed among the cyanobacteria, algae, fungi, and plants, with special emphasis on higher plants; the comparative anatomy and physiology of higher plants; and general ecology, including population, community, and ecosystem dynamics. Two field trips are required. Possible locations include Pt. Reyes, Calaveras Big Trees, UC Davis, and others. (C-ID BIOL 155)

**BIOL 422 Animal Biology 5 Units**

*Prerequisite:* BIOL 402 or an equivalent college-level Cell and Molecular Biology course with a grade of "C" or better.

*General Education:* AA/AS Area IV; CSU Area B2; CSU Area B3; IGETC Area 5B; IGETC Area 5C

*Course Transferable to UC/CSU*

*Hours:* 54 hours LEC; 108 hours LAB

This is part of a three-semester sequence in general biology designed for biology majors. BIOL 412 and BIOL 422 may be taken in any order after completion of BIOL 402 with a grade of C or better. BIOL 422 builds upon and applies concepts developed in BIOL 402 to the study of animals and evolution. Topics covered include principles of evolution such as mechanisms of microevolutionary and macroevolutionary change, population genetics, speciation, extinction, and classification and phylogenetics; a survey of animal phyla and unicellular non-photosynthetic eukaryotic taxa; and animal embryology, development, life cycles, comparative anatomy and physiology, and behavior. Emphasis will be placed on the evolutionary relationships among animals, their adaptations to different environments and modes of life, and the evolutionary origins of novel characteristics throughout Animalia. (C-ID BIOL 150)

**BIOL 430 Anatomy and Physiology 5 Units**

*Prerequisite:* CHEM 305, 309, or 400 with a grade of "C" or better

*Advisory:* AH 110, BIOL 100, BIOL 290, or CHEM 306

*General Education:* AA/AS Area IV; CSU Area B2; CSU Area B3; IGETC Area 5B

*Course Transferable to UC/CSU*

*Hours:* 54 hours LEC; 108 hours LAB

This course is an introduction to normal structure and function in humans. The course emphasizes an understanding of physiological principles as related to body structure. The course includes study of the basic principles of physiology and anatomy, general histology, and the integumentary, skeletal, muscular, and nervous systems. BIOL 431 follows BIOL 430 and is necessary for completion of the study of human anatomy and physiology. (C-ID BIOL 115S)

**BIOL 431 Anatomy and Physiology 5 Units**

*Prerequisite:* CHEM 305 or CHEM 309 or CHEM 400 and BIOL 430 or the equivalent with grades of "C" or better.

*Advisory:* AH 110 with a grade of "C" or better

*General Education:* AA/AS Area IV; CSU Area B2; CSU Area B3; IGETC Area 5B

*Course Transferable to UC/CSU*

*Hours:* 54 hours LEC; 108 hours LAB

This course continues the study of normal structure and function in humans. Included in the course is the study of the circulatory, respiratory, digestive, urinary, reproductive, and endocrine systems. Special topics included in the course are pH, fluids, and electrolytes. (C-ID BIOL 115S)

**BIOL 434 Pathology: The Study of Disease 3 Units**

*Prerequisite:* BIOL 431 with a grade of "C" or better

*General Education:* AA/AS Area IV; CSU Area B2; IGETC Area 5B

*Course Transferable to UC/CSU*

*Hours:* 54 hours LEC

This course applies physiological concepts to the development of disease in humans. This course includes the pathogenesis, signs and symptoms, and treatment and care of major diseases and cancers of the organ systems of the body. Biochemical, cellular, and organ changes that take place during disease development will also be emphasized. This course is intended for students who are about to enter an allied health program.

**BIOL 440 General Microbiology 4 Units**

*Prerequisite:* CHEM 305 or CHEM 309 or CHEM 400 or equivalent with a grade of "C" or better.

*General Education:* AA/AS Area IV; CSU Area B2; CSU Area B3; IGETC Area 5B

*Course Transferable to UC/CSU*

*Hours:* 54 hours LEC; 72 hours LAB

The course includes the study of selected evolutionary, ecological, morphological, physiological, and biochemical aspects of representative micro-organisms. The laboratory includes staining, microscopic examination and identification of microbes, prokaryotic ecology, aseptic technique and isolation of microbes, microbial growth media, control of microbial growth including antibiotic sensitivity testing, metabolism, genetics, taxonomy, protists, fungi, helminths, and arthropod vectors. This course is intended for students in allied health majors.

**BIOL 494 Topics in Biology .5-4 Units**

*Prerequisite:* BIOL 320 with a grade of "C" or better; or college-level Plant Taxonomy course with an emphasis in field identification with a grade of "C" or better.

*Course Transferable to CSU*

*Hours:* 72 hours LEC; 216 hours LAB

This course is designed to enable both science and non-science students to learn about recent developments in biology. Selected topics would not include those that are part of current course offerings. This course may be taken four times for credit providing there is no duplication of topics. UC transfer credit will be awarded only after the course has been evaluated by the enrolling UC campus. The units completed for this course cannot be counted towards the minimum 60 units required for admissions.

**BIOL 495 Independent Studies in Biology 1-3 Units**

*Prerequisite:* None.

*Enrollment Limitation:* Student must obtain approval from an instructor to conduct an independent study with that instructor or instructors.

*Course Transferable to CSU*

*Hours:* 162 hours LAB

This course is for students who wish to develop an in-depth understanding in fundamental topics of biology and to learn to work in a collaborative atmosphere with instructors and other students. The independent studies may be pursued in the classroom, laboratory, and/or field studies. This is particularly valuable for biology and ecology students in preparation for independent research as part of their advanced degrees. Instructor approval is required to enroll in this course. UC transfer credit will be awarded only after the course has been evaluated by the enrolling UC campus. The units completed for this course cannot be counted towards the minimum 60 units required for admissions.

## Biology – Field Studies (BIOLFS)

### BIOL 498 Work Experience in Biology 1-4 Units

*Prerequisite:* BIOL 305, 320, 360, and 362 with grades of “C” or better; A minimum of two of the following courses must be completed with grades of “C” or better: BIOL 305 (Natural History), BIOL 320 (Field Botany), BIOL 360 (Environmental Regulations), and BIOL 362 (Field Methods in Ecology); and, additionally a minimum of two of the elective courses in the Field Ecology Certificate program must be completed with a grade of “C” or better.

*Advisory:* ENGWR 300 with a grade of “C” or better.

*Course Transferable to CSU*

*Hours:* 240 hours LAB

This course provides students with the opportunity to obtain work experience through internships with various resource agencies and private environmental companies and non-profits. The course and internships are strongly correlated with the Field Ecology Certificate program and multiple pre-requisites must be met to qualify for enrollment in this course. Internship sponsors assist students in the acquisition of job skills and the application of knowledge obtained from coursework. This class is available only through instructor consent and an application must be submitted to be considered for internships. The application is available through the Biology Department and can be obtained by emailing a request to [wyttd@scc.losrios.edu](mailto:wyttd@scc.losrios.edu) (David Wyatt).

### BIOL 499 Experimental Offering in Biology .5-4 Units

*Prerequisite:* None

*Course Transferable to UC/CSU*

*Hours:* 54 hours LEC; 36 hours LAB

See Experimental Offering. UC transfer credit will be awarded only after the course has been evaluated by the enrolling UC campus. The units completed for this course cannot be counted towards the minimum 60 units required for admissions.

### BIOLFS 310 Natural History Field Study: Mojave Desert 2 Units

*Prerequisite:* None.

*Advisory:* Students must be in good health and be able to hike moderate distances through a desert environment with uneven ground and in temperatures often above 100 degrees.

*Enrollment Limitation:* This course requires completion of a written course application.

*Course Transferable to CSU*

*Hours:* 18 hours LEC; 54 hours LAB

This field course explores the plants, animals, and geological features of the Mojave Desert. Two or three lectures will occur at Sacramento City College with a mandatory field trip of eight days to the Mojave Desert in Southern California. Accommodations are in a combination of outdoor tent camping for two or three nights and four or five nights at the Desert Studies Center field station. Students will provide their own tents, personal items, and personal field equipment. The course involves moderately strenuous hikes over uneven ground in the desert environment in temperatures that usually exceed 100 degrees. A field station expense fee is due up to four weeks before the first day of class to cover the cost of accommodations, the cost of meals while at the Center, entrance fees to parks, and transportation to and from the desert. If you have questions or need additional information, please contact David Wyatt at 916-558-2406 or by e-mail at [wyttd@scc.losrios.edu](mailto:wyttd@scc.losrios.edu). This course was formerly known as BIOL 394.

### BIOLFS 311 Natural History Field Study: Advanced Study of the Mojave Desert 2 Units

*Prerequisite:* BIOLFS 310 with a grade of “B” or better

*Advisory:* BIOL 305 with a grade of “C” or better; students must be in good health and be able to hike moderate distances through a desert environment with uneven ground and in temperatures often above 100 degrees.

*Enrollment Limitation:* This course requires completion of a course application.

*Course Transferable to CSU*

*Hours:* 18 hours LEC; 54 hours LAB

This multi-day field course provides an advanced opportunity for students to understand in greater detail ecological concepts associated with the xeric environment of the Mojave Desert. Examples of advanced research topics include: interspecific interactions, relationships between a species and their physical environment, desert resource management concerns, and effects of climate change on desert environments. BIOLFS 311 is an extension of BIOLFS 310, Natural History Field Study: Mojave Desert, and provides the student with opportunities to mentor new students in BIOLFS 310 and serve in leadership roles during group learning exercises. These applied experiences and mentoring opportunities are highly desirable to natural resource agencies and to private environmental consultants. Prior completion of BIOLFS 310 (or equivalent) with an A or B grade is a pre-requisite for this course. This course provides elective units involving field experience for students in the Field Ecology Certificate program. This course was formerly known as BIOL 395.

**BIOLFS 312 Natural History Field Study: Baja California 4 Units**

*Prerequisite:* None.

*Advisory:* Students must be in good health and be able to hike moderate distances through a desert environment with uneven ground and in temperatures often above 100 degrees F.

*Enrollment Limitation:* This course requires completion of a written course application.

*Course Transferable to CSU*

*Hours:* 36 hours LEC; 108 hours LAB

This field course explores the natural history of plants and animals of the desert and marine ecosystems of Baja California, Mexico, as well as historic and cultural sites. Three pre-trip lecture meetings will be held at Sacramento City College accompanied by a mandatory field trip of 14 days in Baja California. Accommodations include a combination of up to four nights in motels (during transit to and from Mexico) and ten nights at the field station in Bahia de Los Angeles (Baja California, Mexico). Students will supply their own sleeping bags, personal items (toiletries, etc), and a limited amount of field equipment for use while at the field station. The course involves moderately strenuous hiking in temperatures generally in the high-90s to low-100s (with high humidity) as well as moderate swimming activities during snorkeling expeditions. The program cost to the student will cover accommodations, meals at the field station, and fees required in Mexico. Transportation may also be covered by the program cost. A valid passport for entry to Mexico and re-entry into the United States is required. For any questions or additional information, please contact Steve James at 916-650-2776 or by e-mail at [james@scscc.losrios.edu](mailto:james@scscc.losrios.edu). This course was formerly known as BIOL 390.

**BIOLFS 324 Natural History Field Study: Sutter Buttes 1 Unit**

*Prerequisite:* None.

*Advisory:* Students must be in good health and be able to hike moderate distances through rough terrain.

*Enrollment Limitation:* This course requires completion of a written course application.

*Course Transferable to CSU*

*Hours:* 9 hours LEC; 27 hours LAB

This field course explores the plants, animals, and geological features of the Sutter Buttes, called by many people the "world's smallest mountain range." This is a small, isolated cluster of eroded volcanic lava domes in the middle of the northern portion of California's Central Valley and encompasses over 9,500 square miles in area. Several lectures will occur at Sacramento City College with two mandatory field trips occurring during weekends. The field trips will occur over three days and will explore the habitats and organisms in a portion of the Sutter Buttes. The course involves moderately strenuous hikes over uneven ground thus students need to be in good health for these hikes. A \$20 landowner access cost is required to enter the private properties in the Sutter Buttes. If you have questions or need additional information, please contact David Wyatt at 916-558-2406 or by email at [wyatt@scscc.losrios.edu](mailto:wyatt@scscc.losrios.edu).

**BIOLFS 350 Natural History Field Study: Sierra Nevada Plants 2 Units**

*Prerequisite:* None.

*Advisory:* Students must be in good health and able to hike moderate distances in a high elevation environment with uneven ground and variable temperatures.

*Enrollment Limitation:* This course requires completion of a written course application.

*Course Transferable to CSU*

*Hours:* 18 hours LEC; 54 hours LAB

This field course explores the plants of the Sierra Nevada and surrounding areas. Two to three lectures will occur at Sacramento City College with a mandatory field trip of eight days to the Sierra Nevada. No previous plant identification experience is required, yet intermediate as well as beginning students will benefit from this course. Topics include the identification and keying of plant species, plant adaptations and communities, and uses of plants. Accommodations will be primarily at field research stations (dorms or cabins), but may include outdoor tent camping, as needed. Students will provide their own sleeping bags and field gear. This course involves moderately strenuous hikes in the mountains and desert environments. A field station fee is due before the first pre-trip meeting to cover the cost of accommodations, meals, entrance fees, and transportation. If you have questions or need additional information, please contact Lisa Serafini at [serafil@scc.losrios.edu](mailto:serafil@scc.losrios.edu). This course was formerly known as BIOL 398.

**BIOLFS 495 Independent Studies in Field Biology 1-3 Units**

*Prerequisite:* None.

*Advisory:* Student must obtain approval from an instructor to conduct an independent study in field biology with that instructor or a combination of instructors. In addition, the student is advised to have previously completed a biology field studies course or have previous biological field experiences prior to enrollment in this course.

*Course Transferable to CSU*

*Hours:* 162 hours LAB

This course is for students who wish to develop an in-depth understanding in fundamental topics of field biology and to learn and work in a collaborative atmosphere with instructors and other students. Independent studies are conducted in the field and in the laboratory. This is particularly valuable for biology and ecology students in preparation for independent research as part of their advanced degrees. Instructor approval is required to enroll in this course. Additionally the student is advised to have completed a prior field study course or have previous biological field experiences before enrolling in BIOLFS 495. An independent study project may involve extensive field activities that may occur in rugged and harsh conditions. Therefore, students would need to be in good physical health for most projects. UC transfer credit can be awarded only after the course has been evaluated by the enrolling UC campus. The units completed for this course cannot be counted towards the minimum 60 semester units required for admissions.