

Area: Science and Engineering  
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Degree: A.S. - Environmental Conservation  
 A.S. - General Science  
 Certificate: Environmental Conservation  
 Department Certificates:  
 Environmental Conservation Technician:  
 Conservation/Restoration  
 Fisheries  
 Forest/Rangeland  
 Sustainability  
 Vegetation  
 Water Resources  
 Wildlife

## DEGREES AND CERTIFICATES

### Environmental Conservation A.S. Degree (formerly Natural Resources)

Major Code: 011131A01

Environmental Conservation is an interdisciplinary program that advances the understanding of ecological systems and their interrelationships, including those with human society. Core study involves plant and animal ecology and natural history, field methods and study design, and conservation and management of ecosystems and natural resources. Students have the opportunity to choose among courses in the areas of conservation and sustainability; plant ecology, conservation and management; and vertebrate ecology, conservation and management. This program covers a wide range of environmental studies, provides many unique opportunities for hands-on and real-world field experience, and prepares students for a variety of careers as well as transfer at the upper division level to academic programs involving environmental sciences.

#### Student Learning Outcomes

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

- apply scientific methodologies and critical analysis to environmental investigations
- evaluate natural resource systems, including their past and present use and management, and future sustainability
- analyze social, ethical, and biological implications of environmental management alternatives
- identify ecological phenomena in one's everyday experiences and apply ecological principles to understand local, national and global environmental issues
- assess the relationships of plants and animals to their environment and to each other
- measure, analyze, and monitor biological and physical components of the environment
- evaluate basic land survey, water quality, soils, vegetation, and wildlife data
- examine the significance of biodiversity conservation

### Career Opportunities

An increasing number of sectors of the labor market in California, the U.S., and beyond, require knowledge and skills emphasizing conservation and management of plant and animal populations and their habitats, sustainable resource use, and an enhanced understanding of the environment. This program prepares students for entry-level work in a variety of industries and settings, including private firms, nonprofit organizations, and government agencies at the local, state, and federal levels. Students receive not only rigorous instruction in the theory and application of environmental sciences, but also unique hands-on training.

#### Requirements for Degree 31 - 33 Units

BIOL 300	The Foundations of Biology (3) .....	3 - 5
or BIOL 301	Evolution (3)	
or BIOL 303	Survey of Biology (4)	
or BIOL 310	General Biology (4)	
or BIOL 400	Principles of Biology (5)	
NATR 300	Introduction to Natural Resource Conservation and Policy .....	4
NATR 310	Study Design and Field Methods .....	4
NATR 320	Principles of Ecology .....	4
<b>A minimum of 16 units from the following:</b> .....		16 <sup>1</sup>

BIOL 305	Natural History (4)
BIOL 332	Introduction to Ornithology (4)
BIOL 352	Conservation Biology (3)
BIOL 370	Marine Biology (4)
GEOG 300	Physical Geography: Exploring Earth's Environmental Systems (3)
GEOG 330	Introduction to Geographic Information Systems (3)
GEOL 300	Physical Geology (3)
HORT 302	Soils, Soil Management, and Plant Nutrition (3)
NATR 302	Introduction to Wildlife Biology (4)
NATR 303	Energy and Sustainability (3)
NATR 304	The Forest Environment (3)
NATR 305	Fisheries Ecology and Management (4)
NATR 306	Introduction to Rangeland Ecology and Management (3)
NATR 307	Principles of Sustainability (4)
NATR 322	Environmental Restoration (2)
NATR 324	Field Studies: Birds and Plants of the High Sierra (1.5)
NATR 330	Native trees and shrubs of California (4)
NATR 332	Wildflowers of California (3)
NATR 346	Water Resources and Conservation (3)
NATR 498	Work Experience in Natural Resources (1 - 4)

<sup>1</sup>At least 10 of the 16 units must come from NATR courses.

**Associate Degree Requirements:** The Environmental Conservation Associate in Science (A.S.) Degree may be obtained by completion of the required program, plus general education requirements, plus sufficient electives to meet a 60-unit total. See ARC graduation requirements.

## Environmental Conservation Certificate (formerly Natural Resources)

**Major Code: 011131C01**

Environmental Conservation is an interdisciplinary program that advances the understanding of ecological systems and their interrelationships, including those with human society. Core study involves plant and animal ecology and natural history, field methods and study design, and conservation and management of ecosystems and natural resources. Students have the opportunity to choose among courses in the areas of conservation and sustainability; plant ecology, conservation and management; and vertebrate ecology, conservation and management. This program covers a wide range of environmental studies, provides many unique opportunities for hands-on and real-world field experience, and prepares students for a variety of entry-level positions in the area of environmental sciences and natural resources as well as transfer at the upper division level to academic programs involving environmental sciences.

### Student Learning Outcomes

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

- apply scientific methodologies and critical analysis to environmental investigations
- evaluate natural resource systems, including their past and present use and management, and future sustainability
- analyze social, ethical, and biological implications of environmental management alternatives
- identify ecological phenomena in one's everyday experiences and apply ecological principles to understand local, national and global environmental issues
- assess the relationships of plants and animals to their environment and to each other
- measure, analyze, and monitor biological and physical components of the environment
- evaluate basic land survey, water quality, soils, vegetation, and wildlife data
- examine the significance of biodiversity conservation

### Career Opportunities

An increasing number of sectors of the labor market in California, the U.S., and beyond, require knowledge and skills emphasizing conservation and management of plant and animal populations and their habitats, sustainable resource use, and an enhanced understanding of the environment. This program prepares students for entry-level work in a variety of industries and settings, including private firms, nonprofit organizations, and government agencies at the local, state, and federal levels. Students receive not only rigorous instruction in the theory and application of environmental sciences but unique hands-on training as well.

See [losrios.edu/gainful-emp-info/gedt.php?major=011131C01](http://losrios.edu/gainful-emp-info/gedt.php?major=011131C01) for Gainful Employment Disclosure.

<b>Requirements for Certificate</b>	<b>22 Units</b>
NATR 300 Introduction to Natural Resource Conservation and Policy .....	4
NATR 310 Study Design and Field Methods .....	4
NATR 320 Principles of Ecology .....	4

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

NATR 302	Introduction to Wildlife Biology (4)
NATR 303	Energy and Sustainability (3)
NATR 304	The Forest Environment (3)
NATR 305	Fisheries Ecology and Management (4)
NATR 306	Introduction to Rangeland Ecology and Management (3)
NATR 307	Principles of Sustainability (4)
NATR 322	Environmental Restoration (2)
NATR 324	Field Studies: Birds and Plants of the High Sierra (1.5)
NATR 330	Native trees and shrubs of California (4)
NATR 332	Wildflowers of California (3)
NATR 346	Water Resources and Conservation (3)
NATR 498	Work Experience in Natural Resources (1 - 4)

## General Science Degree

**Major Code: 011229A01**

This program provides a broad study in the fields of biological and physical sciences in preparation for transfer to a four-year program and continuation of studies in upper division science courses.

### Student Learning Outcomes

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

- evaluate new and accepted ideas about the natural universe using scientific methods.
- analyze a wide variety of natural phenomena using basic definitions and fundamental theories of biological or physical sciences.
- apply appropriate quantitative and qualitative methods to interpret and analyze pertinent data.
- outline the basic concepts and fundamental theories of a natural science.
- articulate orally and/or in writing the importance of continuous examination and modification of accepted ideas as a fundamental element in the progress of science.
- discuss ethical components of scientific decision making and apply personal and social values within the process of decision making in scientific endeavors.

**Requirements for Degree** **18 Units**

**A minimum of 18 units from the following: ..... 18<sup>1</sup>**

#### Physical Science Courses:

ASTR	300, 310, 320, 330, 400, 481, 495, 499
CHEM	305, 306, 309, 310, 400, 401, 420, 421, 423, 495, 499
GEOG	300, 301, 305, 306, 307, 308, 309, 391, 392, 393, 394, 495, 499
GEOL	300, 301, 305, 306, 310, 311, 320, 325, 330, 331, 345, 390, 495, 499
PHYS	310, 311, 312, 350, 360, 410, 421, 431, 495, 499
PS	300, 301, 495, 499

#### Biological Science Courses:

ANTH	300, 301, 303, 370, 372, 480, 495, 499
BIOL	300, 301, 303, 305, 310, 322, 332, 342, 352, 370, 375, 390, 400, 410, 415, 420, 430, 431, 440, 442, 482, 495, 499
BIOT	301, 305, 307, 311, 312, 499
NATR	300, 302, 303, 304, 305, 306, 307, 310, 320, 322, 324, 330, 332, 346, 495, 499
PSYC	310, 311, 495, 499

<sup>1</sup>must be transfer-level and must include one laboratory course in a physical science and one laboratory course in a biological science

**Associate Degree Requirements:** The General Science Associate in Science (A.S.) Degree may be obtained by completion of the required program, plus general education requirements, plus sufficient electives to meet a 60-unit total. See ARC graduation requirements.

**DEPARTMENT CERTIFICATES**

**Environmental Conservation Technician: Conservation/Restoration Certificate**

This certificate advances the understanding of ecological systems and their interrelationships, including those with human society. It focuses on ecology, field methods and study design, and conservation and management of ecosystems and natural resources, with an emphasis on environmental restoration theory and practice and global and emerging environmental and conservation issues. Topics include both the causes of ecological degradation and biodiversity loss, as well as the science of development, management, monitoring, and sustainability of restored environments. Conservation priorities and emerging environmental concerns are investigated, such as climate change, energy production, socioeconomic systems, human population, disease dynamics, species extinctions, invasive species, stresses on water resources and food-producing systems, and over-exploitation of natural resources. Emphasis is placed on development of strategies for the establishment of protected areas, monitoring and adaptive management, and conservation outside of protected areas, as well as an understanding of biodiversity at genetic, species, and community/ecosystem levels.

**Student Learning Outcomes**

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

- apply the scientific method and critical analysis to environmental investigations
- evaluate natural resource systems, including their past and present use and management and future sustainability
- analyze social, ethical, and biological implications of environmental management alternatives
- identify ecological phenomena in one’s everyday experiences and apply ecological principles to understand local, national and global environmental issues
- assess the relationships of plants and animals to their environment and to each other
- measure and analyze the physical environment of plant and animal populations
- evaluate basic land survey, water quality, vegetation, and vertebrate wildlife data
- investigate restoration ecology theory and assess and apply restoration practices to real-world environmental restoration problems
- identify global and emerging environmental issues and evaluate potential impacts and possible solutions
- examine biodiversity in terms of biological structure, composition, and function at the genetic, species, ecosystem and landscape levels
- apply fundamental biological and ecological concepts to the examination of critical biological conservation issues

**Career Opportunities**

This program prepares students for entry-level conservation/restoration aide/technician positions in a variety of industries and settings, including private firms, nonprofit organizations, educational institutions, and government agencies at the local, state, and federal levels. Students receive not only rigorous instruction in the theory and application of environmental sciences but also unique hands-on training

in conservation and restoration. Potential job opportunities include work in the areas of survey/monitoring of threatened and endangered species and habitats, planning and execution of restoration projects, climate change adaptation for human communities, conservation advocacy, and other fields.

<b>Requirements for Certificate</b>		<b>14-15 Units</b>
NATR 300	Introduction to Natural Resource Conservation and Policy .....	4
NATR 310	Study Design and Field Methods.....	4
NATR 320	Principles of Ecology .....	4
NATR 322 or BIOL 352	Environmental Restoration (2) ..... Conservation Biology (3)	2 - 3

**Environmental Conservation Technician: Fisheries Certificate**

This certificate advances the understanding of ecological systems and their interrelationships, including those with human society. It focuses on ecology, field methods and study design, and conservation and management of ecosystems and natural resources, with an emphasis on fish evolution, ecology, conservation and management. Marine and freshwater fisheries, their impacts on society and the environment, and sustainability issues are investigated, including environmental, ecological, economic, and social aspects. Commercial and recreational fisheries management and aquaculture are also explored.

**Student Learning Outcomes**

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

- apply the scientific method and critical analysis to environmental investigations
- evaluate natural resource systems, including their past and present use and management and future sustainability
- analyze social, ethical, and biological implications of environmental management alternatives
- identify ecological phenomena in one’s everyday experiences and apply ecological principles to understand local, national and global environmental issues
- assess the relationships of plants and animals to their environment and to each other
- measure and analyze the physical environment of plant and animal populations
- evaluate basic land survey, water quality, vegetation, and wildlife data
- examine the significance of biodiversity conservation
- analyze aspects of fish evolution and ecology important to their management and synthesize basic parameters of fish population dynamics in terms of rate functions and limiting factors
- analyze function and dynamics of freshwater and marine communities, emphasizing those in temperate North America, and their associated fisheries management issues
- interpret fisheries management data, define management problems and stakeholders involved, and suggest appropriate strategies to reach management objectives

**Career Opportunities**

This program prepares students for entry-level fisheries ecologist aide/technician positions in a variety of industries and settings, including private firms, nonprofit organizations, educational institutions, and government agencies at the local, state, and federal levels. Students receive not only

rigorous instruction in the theory and application of environmental sciences but also unique hands-on training in fisheries ecology, conservation, and management. Students prepare for positions in areas such as fisheries conservation and management, basic fish biology research, and aquatic habitat restoration.

Requirements for Certificate		16 Units
NATR 300	Introduction to Natural Resource Conservation and Policy .....	4
NATR 305	Fisheries Ecology and Management.....	4
NATR 310	Study Design and Field Methods.....	4
NATR 320	Principles of Ecology .....	4

### Environmental Conservation Technician: Forest/Rangeland Certificate

This certificate advances the understanding of ecological systems and their interrelationships, including those with human society. It focuses on ecology, field methods and study design, and conservation and management of ecosystems and natural resources, with an emphasis on forests and rangelands. Basic biological and physical science concepts important to a general understanding of forest and rangeland/grassland ecology, forestry, and grazing by native herbivores and livestock are investigated. History of use and management, taxonomy and ecology of plant communities, soils, pests and diseases, and disturbance regimes of forested landscapes and rangelands are explored. Classes assess current policies, multiple-use management, and emerging threats related to forest and rangeland conservation.

#### Student Learning Outcomes

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

- apply the scientific method and critical analysis to environmental investigations
- evaluate natural resource systems, including their past and present use and management and future sustainability
- analyze social, ethical, and biological implications of environmental management alternatives
- identify ecological phenomena in one's everyday experiences and apply ecological principles to understand local, national and global environmental issues
- assess the relationships of plants and animals to their environment and to each other
- measure and analyze the physical environment of plant and animal populations
- evaluate basic land survey, water quality, vegetation, and wildlife data
- examine the significance of biodiversity conservation
- analyze important characteristics, processes, and stressors of population, community, and ecosystem dynamics of forest/ rangeland environments
- evaluate social, ethical, and biological implications of forest/ rangeland conservation and management alternatives, including impacts of grazing and forestry

#### Career Opportunities

This program prepares students for entry-level forest/ rangeland ecologist aide/technician positions in a variety of industries and settings, including private firms, nonprofit organizations, educational institutions, and government agencies at the local, state, and federal levels. Students receive not only rigorous instruction in the theory and

application of environmental sciences but also unique hands-on training in forest/rangeland ecology, conservation, and management. This program prepares students for work in forestry, conservation, land management, grassland and forest ecological research, and other fields.

Requirements for Certificate		15 Units
NATR 300	Introduction to Natural Resource Conservation and Policy .....	4
NATR 304 or NATR 306	The Forest Environment (3) ..... Introduction to Rangeland Ecology and Management (3)	3
NATR 310	Study Design and Field Methods.....	4
NATR 320	Principles of Ecology .....	4

### Environmental Conservation Technician: Sustainability Certificate

This certificate advances the understanding of ecological systems and their interrelationships, including those with human society. It focuses on ecology, field methods and study design, and conservation and management of ecosystems and natural resources, with an emphasis on sustainability. Theoretical and practical aspects of sustainability are explored including social, economic, and environmental dimensions. Sustainable principles and practices are examined in the context of energy production and consumption, transportation systems, food production, water resources, industry, and the built environment. Environmental as well as social and cultural impacts of industrialization, capitalism, and globalization are addressed at various scales, and potential solutions to current problems are discussed.

#### Student Learning Outcomes

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

- apply the scientific method and critical analysis to environmental investigations
- evaluate natural resource systems, including their past and present use and management and future sustainability
- analyze social, ethical, and biological implications of environmental management alternatives
- identify ecological phenomena in one's everyday experiences and apply ecological principles to understand local, national, and global environmental issues
- assess the relationships of plants and animals to their environment and to each other
- measure and analyze the physical environment of plant and animal populations
- evaluate basic land survey, water quality, vegetation, and wildlife data
- examine the significance of biodiversity conservation
- examine technological, geographic, socioeconomic, cultural, and environmental considerations of alternative forms of energy production
- investigate theoretical and practical aspects of sustainability in the context of energy consumption, transportation systems, food production, water resources, industry, the built environment, and socio-cultural institutions and practices

*(continued on next page)*

**(Environmental Conservation Technician:  
Sustainability Department Certificate continued)**

**Career Opportunities**

This program prepares students for entry-level sustainability consultant/technician positions in a variety of industries and settings, including private firms, nonprofit organizations, educational institutions, and government agencies at the local, state, and federal levels. Work opportunities for program graduates include positions in environmental economics, sustainable business practices, green building, as well as sustainable communities, food systems, energy, and transportation.

Requirements for Certificate	15 - 16 Units
NATR 300 Introduction to Natural Resource Conservation and Policy .....	4
NATR 303 Energy and Sustainability (3) .....	3 - 4
or NATR 307 Principles of Sustainability (4)	
NATR 310 Study Design and Field Methods.....	4
NATR 320 Principles of Ecology .....	4

**Environmental Conservation Technician:  
Vegetation Certificate**

This certificate advances the understanding of ecological systems and their interrelationships, including those with human society. It focuses on ecology, field methods and study design, and conservation and management of ecosystems and natural resources, with an emphasis on woody and herbaceous vegetation. Major topics include plant taxonomy, natural history and life cycle, physiology, evolution, human uses of--and threats to--California native plant communities and their component species.

**Student Learning Outcomes**

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

- apply the scientific method and critical analysis to environmental investigations
- evaluate natural resource systems, including their past and present use and management and future sustainability
- analyze social, ethical, and biological implications of environmental management alternatives
- identify ecological phenomena in one's everyday experiences and apply ecological principles to understand local, national and global environmental issues
- assess the relationships of plants and animals to their environment and to each other
- measure and analyze the physical environment of plant and animal populations
- evaluate basic land survey, water quality, vegetation, and wildlife data
- examine the significance of biodiversity conservation
- assess the structure and function of vegetative communities of California
- interpret plant keys and develop skills in their use in plant identification
- collect and prepare a plant collection of representative native California plants
- analyze plant adaptations and environmental gradients in a variety of ecosystems
- investigate the implications of plant conservation, restoration, and community management alternatives

**Career Opportunities**

This program prepares students for entry-level plant ecologist aide/technician positions in a variety of industries and settings, including private firms, nonprofit organizations, educational institutions, and government agencies at the local, state, and federal levels. Students receive not only rigorous instruction in the theory and application of environmental sciences but also unique hands-on training in plant identification, ecology, conservation, and management. Skills developed support student preparation for positions related to plant taxonomy, dendrology, research and management (e.g., of California endemics, unique environments such as vernal pools, invasive species, etc.) and environmental restoration.

Requirements for Certificate	15 - 16 Units
NATR 300 Introduction to Natural Resource Conservation and Policy .....	4
NATR 310 Study Design and Field Methods.....	4
NATR 320 Principles of Ecology .....	4
NATR 330 Native trees and shrubs of California (4) .....	3 - 4
or NATR 332 Wildflowers of California (3)	

**Environmental Conservation Technician:  
Water Resources Certificate**

This certificate advances the understanding of ecological systems and their interrelationships, including those with human society. It focuses on ecology, field methods and study design, and conservation and management of ecosystems and natural resources, with an emphasis on water resources. It provides a historical perspective on water development and explores current and projected water issues. Surface water and groundwater systems are considered, with an emphasis on the interdisciplinary nature of sustainable water resource management that balances urban, agricultural, industrial, and environmental water needs. The implications of water rights and key water policies are considered in evaluating how water is used and exploited.

**Student Learning Outcomes**

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

- apply the scientific method and critical analysis to environmental investigations
- evaluate natural resource systems, including their past and present use and management and future sustainability
- analyze social, ethical, and biological implications of environmental management alternatives
- identify ecological phenomena in one's everyday experiences and apply ecological principles to understand local, national and global environmental issues
- assess the relationships of plants and animals to their environment and to each other
- measure and analyze the physical environment of plant and animal populations
- evaluate basic land survey, water quality, vegetation, and wildlife data
- examine the significance of biodiversity conservation
- describe the hydrologic cycle in both natural and urban environments, including key characteristics of surface water and groundwater resources and their interactions
- investigate the components of integrated water resources planning and management, including evaluation of water policy initiatives and determination of water rights
- analyze future water sustainability scenarios under uncertain conditions, including impacts of drought and climate change

### Career Opportunities

This program prepares students for entry-level water resources aide/technician positions in a variety of industries and settings, including private firms, nonprofit organizations, educational institutions, and government agencies at the local, state, and federal levels. Students receive not only rigorous instruction in the theory and application of environmental sciences but also unique hands-on training in water resources conservation and management, preparing them for positions in environmental consulting and planning, water conservation, hydrological research, and other fields.

Requirements for Certificate		15 Units
NATR 300	Introduction to Natural Resource Conservation and Policy.....	4
NATR 310	Study Design and Field Methods.....	4
NATR 320	Principles of Ecology.....	4
NATR 346	Water Resources and Conservation.....	3

### Environmental Conservation Technician: Wildlife Certificate

This certificate advances the understanding of ecological systems and their interrelationships, including those with human society. It focuses on ecology, field methods and study design, and conservation and management of ecosystems and natural resources, with an emphasis on vertebrate wildlife. Major topics include population ecology; community dynamics; wildlife habitat; management of game, invasive, and non-game species; conservation of threatened and endangered wildlife; and theoretical and practical tools and methods for studying wildlife, such as sampling techniques, population modeling, habitat assessment, radiotelemetry, and remote sensing.

#### Student Learning Outcomes

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

- apply the scientific method and critical analysis to environmental investigations
- evaluate natural resource systems, including their past and present use and management and future sustainability
- analyze social, ethical, and biological implications of environmental management alternatives
- identify ecological phenomena in one's everyday experiences and apply ecological principles to understand local, national and global environmental issues
- assess the relationships of plants and animals to their environment and to each other
- measure and analyze the physical environment of plant and animal populations
- evaluate basic land survey, water quality, vegetation, and wildlife data
- examine the significance of biodiversity conservation
- apply and compare various wildlife habitat and population assessment techniques across a variety of environmental settings
- interpret wildlife population data and construct a population model, evaluating alternative wildlife management decisions based on computer-simulation results
- evaluate alternative wildlife management decisions in the context of ecosystem dynamics as well as and social/cultural and economic considerations

### Career Opportunities

This program prepares students for entry-level wildlife biologist aide/technician positions in a variety of industries and settings, including private firms, nonprofit organizations, educational institutions, and government agencies at the local, state, and federal levels. Students receive not only rigorous instruction in the theory and application of environmental sciences but also unique hands-on training in wildlife ecology, conservation, and management. Participants develop skills appropriate for positions dealing with aspects of wildlife such as population sampling and monitoring, data analysis, and management/conservation of threatened, endangered, and invasive species of wildlife.

Requirements for Certificate		16 Units
NATR 300	Introduction to Natural Resource Conservation and Policy.....	4
NATR 302	Introduction to Wildlife Biology.....	4
NATR 310	Study Design and Field Methods.....	4
NATR 320	Principles of Ecology.....	4

### Natural Resources

#### NATR 300 Introduction to Natural Resource Conservation and Policy 4 Units

General Education: AA/AS Area IV

Course Transferable to UC/CSU

Hours: 72 hours LEC

This course provides a survey of concepts, issues, laws and regulations relevant to natural resources, such as soils, water, wildlife, fisheries, rangelands, and forests, with a focus on their sustainable management and conservation. Overexploitation, pollution, land use, and waste issues are integrated throughout the course. Principles, problems, and solutions are explored in the context of economics, ethics, and past, present, and future natural resource issues. Critical thinking and ecological dynamics are stressed. Sustainability, global environmental problems, and energy are major themes. It also examines the environmental regulatory process in California. Federal and California environmental laws are studied and discussed. Field trips may be required.

#### NATR 302 Introduction to Wildlife Biology 4 Units

Advisory: Eligible for ENGRD 310 or ENGRD 312 AND ENGWR 300; OR ESLR 340 AND ESLW 340; AND eligible for transfer-level Math.

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; 54 hours LAB

This course is an introduction to the science of wildlife biology and the basic principles and techniques involved in wildlife research, conservation, and management. It emphasizes ecological aspects of wildlife populations and communities such as predator-prey relationships, population dynamics, diseases and parasites of wildlife, and wildlife habitat. Animal behavior, nutritional ecology, and other aspects of wildlife biology are also explored. Human dimensions of wildlife management including wildlife restoration and conservation, human-wildlife conflicts, hunting, invasive species, impacts of global climate change, and other relevant issues are examined. Social, economic, and ecological implications of management alternatives are investigated. Additionally, this course provides hands-on experience with habitat and population sampling, data analysis and interpretation; radio telemetry; wildlife capture and handling; and critical analysis of wildlife management policies and the development of a wildlife management plan. Field trips are required.

**NATR 303 Energy and Sustainability****3 Units***Same As: ENERGY 303**Advisory: MATH 120, 125, 129, 133 or higher; NATR 300, or an equivalent transferable life science course; and Eligible for ENGRD 310 or ENGRD 312 AND ENGWR 300, OR ESLR 340 AND ESLW 340.**General Education: AA/AS Area IV**Course Transferable to CSU**Hours: 54 hours LEC*

This course investigates fundamentals of energy and impacts of energy systems on society and the environment. It explores energy resources, efficiency, conservation, and emerging technologies. Specifically addressed are mechanics, advantages, disadvantages, and sustainability of current and future energy systems. This course also focuses on economic, cultural, political, and environmental aspects of energy production and consumption in the context of the built environment, transportation, food systems, manufacturing, and public services. Field trips may be required. This course is not open to students who have completed ENERGY 303 or ET 303.

**NATR 304 The Forest Environment****3 Units***Advisory: (1) MATH 120 or higher; (2) eligible for ENGRD 310 or ENGRD 312 AND ENGWR 300; OR ESLR 340 AND ESLW 340.**General Education: AA/AS Area IV**Course Transferable to UC/CSU**Hours: 54 hours LEC*

This course covers basic biological and physical science concepts important to a general understanding of forest ecology and forestry. It investigates tree anatomy and basic physiology, forest types and distributions across the World, ecological processes and species adaptations, forests of the United States and the history of their use, California forests and major tree species, soils, fire ecology and natural selection, and pests and diseases of forest trees. Additional topics include the role of fire in forest management, the science of silviculture and forestry, forest management and harvest techniques, history of the forest conservation movement, and current issues and policies related to forest resource use. Field trips are required.

**NATR 305 Fisheries Ecology and Management****4 Units***Advisory: Eligible for ENGRD 310 or ENGRD 312 AND ENGWR 300; OR ESLR 340 AND ESLW 340; AND eligible for transfer-level math.**General Education: AA/AS Area IV (effective Summer 2016); CSU Area B2; CSU Area B3**Course Transferable to CSU**Hours: 54 hours LEC; 54 hours LAB*

This course covers the fundamentals of marine and freshwater fisheries, ecosystems, and their impacts on society and the environment. Fish life history, ecology, habitats, and population dynamics are examined. Fisheries' sustainability issues are investigated, including environmental, ecological, economic, and social aspects. Commercial and recreational fisheries management and aquaculture are covered. Field trips are required.

**NATR 306 Introduction to Rangeland Ecology and Management****3 Units***Course Transferable to CSU**Hours: 36 hours LEC; 54 hours LAB*

This course introduces the science of range ecology and management. It covers ecological principles that apply to rangeland ecosystems and their conservation and management, as well as the history of rangelands and their management. This course focuses on the

interactions among the different components of rangelands: soils, plants, non-human animals, and people. The effects of different management systems on ecosystem services provided by rangelands are studied, including food, fiber, fuel, water, habitat, and carbon sequestration. In addition, it explores current issues and research surrounding rangeland conservation, sustainability, restoration, and climate change. Field trips are required.

**NATR 307 Principles of Sustainability****4 Units***General Education: AA/AS Area V(b); CSU Area D7; IGETC Area 4**Course Transferable to UC/CSU**Hours: 54 hours LEC; 54 hours LAB*

Theoretical and practical aspects of sustainability are explored including social, economic, and environmental dimensions. Sustainable principles and practices are examined in the context of energy production and consumption, transportation systems, food production, water resources, industry, and the built environment. The environmental as well as social and cultural impact of industrialization is addressed, and solutions to current problems are discussed. Field trips may be required.

**NATR 310 Study Design and Field Methods****4 Units***Advisory: NATR 300; MATH 120 or higher; eligible for ENGRD 310 or ENGRD 312 AND ENGWR 300; OR ESLR 340 AND ESLW 340.**General Education: AA/AS Area IV; CSU Area B2; CSU Area B3**Course Transferable to CSU**Hours: 54 hours LEC; 54 hours LAB*

This course addresses study design and field methods important to the field of natural resources. It covers basic statistical approaches and sampling designs, and introduces a variety of sampling and monitoring protocols and techniques. Field labs provide practice with a variety of hands-on methods for vertebrate study, vegetation assessment, land survey, and aquatic studies. Specific portions of the course focus on (1) survey skills including distance and direction measurement, topographic map reading, and Geographic Information Systems (GIS); (2) woody and herbaceous vegetation sampling strategies such as transect and quadrat, and habitat assessment; (3) methods used in terrestrial vertebrate wildlife studies, such as radio telemetry, remote cameras, and live-trapping; and (4) techniques specific to aquatic ecology and water quality measurements. It also includes applications of GIS and Global Positioning Systems (GPS). Field trips may be required.

**NATR 320 Principles of Ecology****4 Units***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; 54 hours LAB*

This course covers basic principles of ecology, including the physical and biological factors of different environments in relation to the distribution and abundance of plants and animals. Emphasis is on the management of ecosystems using ecological principles and the understanding of current ecological issues. Field trips are required.

**NATR 322 Environmental Restoration****2 Units***Advisory: NATR 300, 302, 310, 320, and 330**Course Transferable to CSU**Hours: 27 hours LEC; 27 hours LAB*

This course covers fundamental principles and practices of environmental restoration--the process in which a damaged resource is renewed biologically, structurally, and functionally. Topics include both the causes of ecological degradation and biodiversity loss, as well as the science of development, management, monitoring, and sustainability of restored environments. Ecological principles,

ecosystem processes, and biological interactions are covered in the context of restoration of wildlands and more urbanized areas. The course emphasizes hands-on experience with a variety of restoration techniques and materials in diverse habitats. Previously restored habitats in the Sacramento region are explored and current restoration sites are evaluated. Field trips may be required.

**NATR 324 Field Studies: Birds and Plants of the High Sierra** **1.5 Units**

*Course Transferable to UC/CSU*  
*Hours: 9 hours LEC; 54 hours LAB*

This field study course focuses on identification, distribution, abundance, ecological relationships, and conservation of bird and plant communities of the High Sierra. Primary environments explored include montane chaparral, riparian woodland, coniferous forest, montane bog and fen, rocky outcrop, montane meadow, subalpine woodland, and alpine tundra. Emphasis is placed on the natural history and life history characteristics of common birds and plants, as well as rare and endangered species and their conservation challenges. Field trips are required.

**NATR 330 Native Trees and Shrubs of California** **4 Units**

*Advisory: Eligible for ENGRD 310 or ENGRD 312 AND ENGWR 300; OR ESLR 340 AND ESLW 340*  
*General Education: AA/AS Area IV*  
*Course Transferable to UC/CSU*  
*Hours: 54 hours LEC; 54 hours LAB*

This dendrology course covers classification and ecology of major natural plant communities of California and their component tree and shrub species. Emphasis is placed on biotic and abiotic factors of native woody plant distribution and abundance in northern California, focusing on characterization of the dominant vegetation types and identification of native woody species. Major topics include plant adaptation, evolution, and diversity in time and space; morphology and physiology; life history; soils, climate, and topography; endemism; interspecific and intraspecific interactions; invasive species; disease; anthropogenic and natural environmental change; human uses of native plants; and native plant restoration and conservation. This course involves the creation of a plant collection including at least 60 representative native woody species. Field trips are required.

**NATR 332 Wildflowers of California** **3 Units**

*Advisory: NATR 330*  
*General Education: AA/AS Area IV*  
*Course Transferable to UC/CSU*  
*Hours: 36 hours LEC; 54 hours LAB*

This course investigates biology, ecology, conservation, and management in the context of California wildflowers. Field labs focus on the California Floristic Province. The identification, distribution, and interrelationships of herbaceous plants in their natural environment, physical and biological influences, ecological relationships, and representative plant communities are examined. Special emphasis is given to the study of plant families in our local grasslands, vernal pools, oak woodlands, and foothills. Field trips may be required.

**NATR 346 Water Resources and Conservation** **3 Units**

*Advisory: MATH 120, 125, 129, 133 or higher; NATR 300, or an equivalent transferable life science course; and eligible for ENGRD 310 or ENGRD 312 AND ENGWR 300, OR ESLR 340 AND ESLW 340.*  
*General Education: AA/AS Area IV*  
*Course Transferable to CSU*  
*Hours: 54 hours LEC*

This course provides an introduction to water resource management with an emphasis on water issues in California. It provides a historical perspective on water development and explores current and projected water issues. Surface water and groundwater systems are considered, with an emphasis on the interdisciplinary nature of sustainable water resource management that balances urban, agricultural, industrial, and environmental water needs. The implications of water rights and key water policies are considered in evaluating how water is used and exploited. Field trips may be required.

**NATR 495 Independent Studies in Natural Resources** **1-3 Units**

*Prerequisite: None*  
*Course Transferable to CSU*  
*Hours: 54-162 hours LAB*

Independent Study is an opportunity for the student to extend classroom experience in this subject, while working independently of a formal classroom situation. Independent study is an extension of work offered in a specific class in the college catalog. To be eligible for independent study, students must have completed the basic regular catalog course at American River College. They must also discuss the study with a professor in this subject and secure approval. Only one independent study for each catalog course will be allowed.

**NATR 498 Work Experience in Natural Resources** **1-4 Units**

*Advisory: Eligible for ENGRD 310 or ENGRD 312 AND ENGWR 300; OR ESLR 340 AND ESLW 340.*  
*Enrollment Limitation: Students must be in a paid or unpaid internship, volunteer position, or job related to natural resources with a cooperating site supervisor. Students are advised to consult with the Natural Resources Department faculty to review specific certificate and degree work experience requirements.*  
*General Education: AA/AS Area III(b)*  
*Course Transferable to CSU*  
*Hours: 60-300 hours LAB*

This course provides students with opportunities to develop marketable skills in preparation for employment or advancement within the field of natural resources. It is designed for students interested in work experience and/or internships in transfer-level degree occupational programs. Course content includes understanding the application of education to the workforce, completion of Title 5 required forms which document the student's progress and hours spent at the work site, and developing workplace skills and competencies. During the semester, the student is required to complete 75 hours of related paid work experience, or 60 hours of related unpaid work experience for one unit. An additional 75 or 60 hours of related work experience is required for each additional unit. All students are required to attend the first class meeting, a mid-semester meeting, and a final meeting. Additionally, students who have not already successfully completed a Work Experience course will be required to attend weekly orientations while returning participants may meet individually with the instructor as needed. Students may take up to 16 units total across all Work Experience course offerings. This course may be taken up to four times when there are new or expanded learning objectives. Only one Work Experience course may be taken per semester.