BIOL G110: ECOLOGY AND FIELD BIOLOGY

Item	Value
Curriculum Committee Approval Date	11/02/2021
Top Code	030100 - Environmental Science
Units	3 Total Units
Hours	90 Total Hours (Lecture Hours 36; Lab Hours 54)
Total Outside of Class Hours	0
Course Credit Status	Credit: Degree Applicable (D)
Material Fee	Yes
Basic Skills	Not Basic Skills (N)
Repeatable	No
Open Entry/Open Exit	No
Grading Policy	Standard Letter (S)
Local General Education (GE)	• Area 5 Natural Sciences (GB1)
California General Education Transfer Curriculum (Cal-GETC)	• Cal-GETC 5B Biological Sciences (5B) • Cal-GETC 5C Laboratory Activity (5C)
Intersegmental General Education Transfer Curriculum (IGETC)	• IGETC 5B Biological Sciences (5B) • IGETC 5C Laboratory Activity (5C)
California State University General Education Breadth (CSU GE-Breadth)	• CSU B2 Life Science (B2) • CSU B3 Laboratory Activity (B3)

Course Description

This course is an introduction to the science of the environment with an emphasis on the natural environment, ecological processes, and the roles that humans assume as they change the environment and ecology of the areas from which resources are taken. Topics include ecological principles, biodiversity, climate change, renewable and non-renewable energy, water resources, pollution, and the role of science in finding sustainable solutions. This course includes field trips in Southern California. Transfer Credit: CSU; UC.

Course Level Student Learning Outcome(s)

1. Course Outcomes
2. Describe ocean life zones.
3. Describe the steps that may be taken to preserve endangered species.
4. Outline human impact on ecosystems.
5. Distinguish differences among major terrestrial biomes.
6. Discuss major themes in ecology.

Course Objectives

- 1. Explain the roles of humans as they interact with their environment, including sustainability and reducing environmental impact (such as pollution, habitat destruction, and climate change).
- 2. Distinguish among biomes found throughout Southern California.
- 3. Identify in differences in biodiversity among ocean life zones.
- 4. Demonstrate scientific methods for the sampling biodiversity and the application statistics appropriate for biodiversity data.
- 5. Outline the steps that may be taken to preserve species listed as endangered.
- 6. Describe how living things of all types interact with each other within a community.
- 7. Analyze graphics and statistics pertaining to population ecology.
- 8. Review policies and practices used by current industries (such as the water and sanitation districts) that allow sustainable use of natural resources.
- 9. Apply ecological principles when making day-to-day decisions that ultimately have an environmental impact.
- 10. Elaborate on the two major processes that occur in an ecosystem: energy flow and biogeochemical cycling.

Lecture Content

Generalizations of science Basic chemistry Atoms, molecules, and bonding Properties of matter Basic physics First and Second Laws of Thermodynamics Scientific method Basic steps in the method Outside motivations that may spoil results of experiments Ecosystems The cycling of matter Hydrologic cycle Carbon cycle Nitrogen cycle Flow of energy Communities Definition Community interactions Predator/prey Competition Symbiosis Interaction avoidance Populations Definition Population growth Exponential growth Logistic growth Growth curves that overshoot carrying capacity Factors that control population growth Population ecology Distribution within the environment Age structure Survivorship curves The activities involved in human population size and growth Factors affecting population growth/shrinkage Population monitoring and planning via age structure diagrams Management of ecosystems Preservation techniques Reasons for the preservation of ecosystems Land management systems in the U.S. Focus on North American forest structure and management Tropical rain forest management Reasons for harvesting Methods of undoing damage to ecosystems Sustaining aquatic biodiversity General trends in global aquatic biodiversity Human effects on aquatic systems Minimizing negative effects on aquatic systems The species appro ach to maintaining terrestrial biodiversity Types of extinction "Threatened" vs. "Endangered" Characteristics of organisms that are vulnerable to extinction by human action Methods of maintaining terrestrial biodiversity via the species approach The life zones associated with marine intertidal areas Salt water estuaries, coastal wetlands, mangrove swamps Rocky intertidal Sandy shores Coral reefs The effects of climate and weather on the distribution of terrestrial biomes Climate vs. weather Factors contributing to global climate patterns Biome study Grasslands Chaparral Deserts Tundras Mountains Forests Freshwater life zones Lotic zones Lentic zones Oligotrophic vs. eutrophic lakes Spring/winter turnover in lakes Human impact on freshwater ecosystems Evolution Definition Four ways to change allele frequencies Speciation Extinction

Lab Content

Predators and prey Review factors that control population growth Population ecology Natural selection Predator-prey relationships Interpretation of data and graph Community interactions Review community interactions Sampling of native and non-native communities Data collection and interpretation for evidence of community interactions Ecological specialization Animal behavior Estimating biodiversity Define

biodiversity Species richness Species evenness Shannon Diversity Index Measuring biodiversity Review sustainability and environmental impact Sampling methods Data collection and interpretation Calculating percent error Restoration of native habitats Field trips to local native habitats - Bolsa Chica Ecological Reserve / optional Southern CA protected area Review land management and preservation techniques Reasons for preservation, conservation, and restoration of ecosystems Sustainability Anthropogenic factors affecting native habitats Habitat Degradation and destruction Participation in the restoration of local native habitats Resource partitioning Define Observation-based data collection Guass law of competitive exclusion Adaptations Field notebooks and reports Demonstrate use of hand-held field devices to measure GPS and abiotic measurements Focal and scanning sampling methods Usage of dichotomous key and field guides Survey of intertidal organisms Field trip to southern California rocky intertidal habitat Review methods for surveying intertidal organi sms Adaptations at associated intertidal zones Tides Community interactions Abiotic factors Anthropogenic factors affecting intertidal organisms and habitat Conservation and Marine Protected Areas (MPA) Compare rocky vs. sandy intertidal Examination species approach to preserving biodiversity Field trip to the local animal care center Review anthropogenic factors causing species decline Conservation and wildlife management Marine communities and life strategies Review Ocean Life Zones Field trip - Long Beach Aquarium of the Pacific/optional Southern California Aquaria Biome Study Field trip(s) to local biomes Adaptations Abiotic and biotic factors Anthropogenic effects on marine and/or terrestrial systems Conservation Water quality and human impacts on the water cycle Field trip to water or sanitation districts Review policies and practices used by current industries Sustainability

Method(s) of Instruction

- Lecture (02)
- DE Live Online Lecture (02S)
- DE Online Lecture (02X)
- Lab (04)
- DE Live Online Lab (04S)
- DE Online Lab (04X)

Reading Assignments

Readings in text as assigned

Writing Assignments

Students must complete reports on data collected from laboratory and field.

Out-of-class Assignments

1. Library research project2. Lecture reinforcement questions

Demonstration of Critical Thinking

After gathering data in the laboratory and field, the student must organize and analyze these data. Students must analyze the factors that determine the different natural ecosystems found in California and the adaptations of plants and animals to these systems and their living conditions.

Required Writing, Problem Solving, Skills Demonstration

Students must complete reports on data collected from laboratory and field. The students will also demonstrate a mastery of the course objectives by taking essay examinations.

Eligible Disciplines

Biological sciences: Master's degree in any biological science OR bachelor's degree in any biological science AND master's degree in biochemistry, biophysics, or marine science OR the equivalent. Master's degree required. Ecology: Master's degree in ecology or environmental studies OR the equivalent OR see interdisciplinary studies. Master's degree required.

Textbooks Resources

1. Required Miller, G. Tyler. Essentials of Ecology, 7th(most recent) ed. Brooks/Cole, 2014 Rationale: Appropriate for the course content. 2. Required Molles. M and Sher, A. Ecology: Concepts and Applications, 8th ed. Mc Graw Hill, 2019

Manuals Resources

1. Ford, D. and Reynolds, B. A Laboratory Manual for Introduction to Environmental Science, Kendall Hunt , 01-01-2020

Other Resources

1. Laboratory handouts 2. Lecture handouts