BIO 12 Course Outline as of Fall 2016

CATALOG INFORMATION

Dept and Nbr: BIO 12 Title: BASIC CONCEPTS/ECOL
Full Title: Basic Concepts of Ecology
Last Reviewed: 1/24/2022

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	3.00	Lecture Scheduled	3.00	17.5	Lecture Scheduled	52.50
Minimum	3.00	Lab Scheduled	0	6	Lab Scheduled	0
		Contact DHR	0		Contact DHR	0
		Contact Total	3.00		Contact Total	52.50
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 105.00 Total Student Learning Hours: 157.50

Title 5 Category:	AA Degree Applicable
Grading:	Grade or P/NP
Repeatability:	00 - Two Repeats if Grade was D, F, NC, or NP
Also Listed As:	
Formerly:	

Catalog Description:
Basic principles of ecology including ecosystems, community and population biology, and their application to problems of renewable resources, resource management, conservation, and global environmental issues.

Prerequisites/Corequisites:

Recommended Preparation:
Eligibility for ENGL 100 or ESL 100

Limits on Enrollment:

Schedule of Classes Information:
Description: Basic principles of ecology including ecosystems, community and population biology, and their application to problems of renewable resources, resource management, conservation, and global environmental issues. (Grade or P/NP)
Prerequisites/Corequisites:
Recommended: Eligibility for ENGL 100 or ESL 100
Limits on Enrollment:

Transfer Credit: CSU;UC.
Repeatability: Two Repeats if Grade was D, F, NC, or NP

ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:

AS Degree:	**Area**		Effective:	Inactive:
	C	Natural Sciences	Fall 1981	
	H	Global Perspective and Environmental Literacy		
CSU GE:	**Transfer Area**		Effective:	Inactive:
	B2	Life Science	Fall 1981	
IGETC:	**Transfer Area**		Effective:	Inactive:
	5B	Biological Sciences	Fall 1981	

CSU Transfer:	Transferable	Effective:	Fall 1981	Inactive:
UC Transfer:	Transferable	Effective:	Fall 1981	Inactive:

CID:

Certificate/Major Applicable:
Both Certificate and Major Applicable

COURSE CONTENT

Student Learning Outcomes:
At the conclusion of this course, the student should be able to:
1. Describe the role of the scientific method in understanding ecological processes.
2. Integrate knowledge of evolution and ecology as it applies to biodiversity and biological conservation.
3. Explain the interconnectedness of abiotic and biotic factors (including humans) and their influence on the abundance and distribution of species.
4. Apply ecological concepts towards understanding regional and global environmental issues.

Objectives:
Upon completion of this course, students will be able to:
1. Apply methods of science and scientific investigation.
2. Analyze the basic principles and assumptions of ecology, including the cellular nature of life, correlation of structure and function, energy transformation, growth and development, evolution and characteristics of systems.
3. Evaluate the relationship between physiological and anatomical adaptations of plants, animals, and aquatic organisms to environmental factors.
4. Examine the limiting factors for species and their effect on species distribution and community ecosystem structure.
5. Examine the basics of biosphere processes (climatic, physiographic, and biotic) and apply this knowledge to understanding the distribution of major biomes.
6. Diagram ecosystem structure and function, including trophic structure and function, productivity, and mineral cycles.
7. Examine current global and ecosystem level environmental problems, and synthesize the application of ecosystem studies to their solutions
8. Examine community ecology, including competition, species interactions, diversity, stability,

vegetation ecology, island biogeography, ecological succession and its application to current issues, park/preserve design, restoration, reforestation, and conservation.
9. Analyze population dynamics including patterns of distribution and dispersal, age structure, growth, "r" vs. "k" characteristics, interspecific and intraspecific factors and apply these concepts to human population dynamics.
10. Synthesize the interplay of economic and ecological considerations for managing biosphere resources with examples in ecosystem management (e.g., forests, rangelands, wetlands, endangered species and the maintenance of biodiversity).

Topics and Scope:

A. Ecology as science:
   1. Ecology as a subdivision of biology
   2. Scientific approaches to problems - science as a way of knowing.
B. Foundational principles
   1. Cellular and chemical nature of life: basic chemistry, properties of water, overview of cell structures and functions
   2. Structure and function; physiological and anatomical adaptations
   3. Energetics; photosynthesis, cellular respiration, laws of thermodynamics
   4. Growth and development
   5. Evolution: species adaptations, speciation, evolution of ecosystems
   6. Characteristics of systems
C. Adaptations of plants, animals, and aquatic organisms
   1. Limiting Factors
   2. Species distribution
   3. Community and ecosystem structure
D. Biosphere structure and function
   1. Climate: precipitation, temperature, climatic zones, climate change
   2. Effects of climate on biogeography and formation of major landscape types (biomes)
E. Ecosystem structure and function
   1. Principles of cycle and flow
   2. Trophic structure: productivity, energy flow in ecosystems, food chains and webs, and ecosystem structure.
   3. Mineral cycles: carbon cycle, nitrogen cycle, water cycle.
   4. Issues in ecosystem resource management: global warming, water availability, water quality and pollution, human food supplies and sources, application of ecosystem studies to agriculture
F. Community structure and function
   1. Interspecific competition: habitat and niche, competitive exclusion, resource partitioning
   2. Species interactions: predation, parasitism; mutualism, herbivorey, commensalism and coevolution.
   3. Diversity, dominance, complexity, stability, resistance and resilience: applications to resource management and tropical systems.
   4. Vegetation ecology: community structure and landscape ecology
   5. Island biogeography: species diversity, migration, extinction and replacement rates, and applications to biodiversity, conservation biology and preserve/park design.
   6. Ecological succession: primary, secondary, mechanisms of successional change, applications to restoration (reforestation, mining, agriculture, etc.)

G. Biodiversity: genetic, species, community, ecosystem, alpha, beta and gamma levels of diversity
H. Population structure and function
  1. Patterns of distribution and dispersal
  2. Age structure and life tables
  3. Population growth, exponential, density dependent and density independent growth limits.
  4. Dynamics of "r" and "k" selected species
  5. Applications to human population dynamics and resource management.
I. Management and conservation of natural resources
  1. General principles of sustainable resource management
  2. The interface of ecology and economics
  3. Ecosystem management case studies e.g., forests, rangelands, wetlands
  4. Importance and maintenance of biodiversity: endangered species and ecosystems, and management for conservation.

Assignment:

1. Read text and other assigned readings, 20-40 pages per week.
2. In class work: exercises, presentations, class discussions
3. Term report, 4-6 pages, summarizing and examining current environmental issues
4. Response papers, 1-3, 1-2 pages each
5. Field trip reports, 1-2, 1-2 pages each
6. Quizzes, 3-10 and exams, 3-5, including 1 final exam.

Methods of Evaluation/Basis of Grade:

Writing: Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

Term report; response papers; field trip reports	Writing 30 - 50%

Problem Solving: Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

None	Problem solving 0 - 0%

Skill Demonstrations: All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

None	Skill Demonstrations 0 - 0%

Exams: All forms of formal testing, other than skill performance exams.

Quizzes, final exams: multiple choice, short answer, and essay	Exams 40 - 60%

Other: Includes any assessment tools that do not logically fit into the above categories.

Field trips, in-class work	Other Category 5 - 15%

Representative Textbooks and Materials:
Ecology, international edition, Krebs, Benjamin Cummings, 2013
Elements of Ecology, 8th edition, Smith & Smith; Benjamin Cummings Publishers, 2012