BIO 12 Course Outline as of Fall 2022

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:
Students will be introduced to basic ecological principles and their application to problems of renewable resources, resource management, conservation, and global environmental issues. Field trips may be required.

Prerequisites/Corequisites:

Recommended Preparation:
Eligibility for ENGL 100 or ESL 100

Limits on Enrollment:

Schedule of Classes Information:
Description: Students will be introduced to basic ecological principles and their application to problems of renewable resources, resource management, conservation, and global environmental issues. Field trips may be required (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:
At the conclusion of this course, the student should 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 concepts in community ecology, including competition, species interactions,

diversity, stability, vegetation ecology, island biogeography, and ecological succession, and apply them 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:

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

A. Patterns of distribution and dispersal
B. Age structure and life tables
C. Population growth: exponential growth and density dependent and independent growth limits
D. Dynamics of "r" and "k" selected species
E. Applications to human population dynamics and resource management

IX. Management and Conservation of Natural Resources
A. General principles of sustainable resource management
B. The interface of ecology and economics
C. Ecosystem management case studies (e.g., forests, rangelands, and wetlands)
D. 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. Class work: exercises, presentations, class discussions
3. Semester project (e.g. research report or presentation) summarizing and examining current ecological issues
4. Response paper(s) 1-2 pages each (1-3)
5. Field trip report(s) 1-2 pages each (0-2)
6. Quizzes (3-10) and exams (3-5) including 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.

Semester project, 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 and 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, class work	Other Category 5 - 15%

Representative Textbooks and Materials:
Ecology: Concepts and Applications. 8th edition. Molles, M and Sher, A. McGraw Hill. 2019
Elements of Ecology. 9th edition. Smith, T. and Smith, R. Benjamin Cummings Publishers. 2015 (classic)