



COURSE OUTLINE

Course Number BIO 204	Course Title Ecology	Credits 4
Hours: Lecture/Lab/Other 3 lec/3 lab	Co- or Pre-requisite Pre: C or better in BIO 101 Co: BIO 102	Implementation Semester & Year Fall 2022

Catalog description:

Fundamental concepts, theoretical principles, and practical applications of modern ecology: the study of the interactions of organisms with each other and their environment. Laboratory classes of this introductory course involve field work and research projects geared towards ecological application.

General Education Category:
Goal 3: Science

Course coordinator:
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Required texts & Other materials:

Elements of Ecology 9th Edition, 2015, Thomas M. Smith and Robert Leo Smith, Pearson
ISBN: 9780321934185

Course Student Learning Outcomes (SLO):

Upon successful completion of this course the student will be able to:

1. Discuss ecological applications and understand how ecology is the study of relationships between organisms and their environment. [Supports ILG #1, 2, 3, 4, 8, 10, 11 and PLO #1, 2, 3, 4, 5]
2. Examine the diversity of life and explain the biological processes that link them together. [Supports ILG #1, 3, 4, 8, 10, 11 and PLO #1, 2, 3, 4, 5]
3. Apply concepts of biological evolution to all course topics. [Supports ILG #1, 3, 4, 8, 10, 11 and PLO #1, 2, 3, 4]
4. Examine plant diversity and explain the process of photosynthesis, nutrient uptake, reproduction, and adaptation to the environment. [Supports ILG #1, 3, 4, 8, 10, 11 and PLO #1, 2, 3, 4, 5]
5. Examine animal diversity and explain how structure and function regulate bioenergetic, physiological, behavioral processes, and adaptation to the environment. [Supports ILG #1, 3, 4, 8, 10, 11 and PLO #1, 2, 3, 4]
6. Explore ecological principals that link individuals at populations, community, landscape, and ecosystem levels. [Supports ILG #1, 2, 3, 4, 5, 7, 8, 9, 10, 11 and PLO #1, 2, 3, 4, 5]
7. Investigate the effects humans are having on disrupting natural ecosystem function. [Supports ILG #1, 2, 3, 4, 5, 7, 8, 9, 10, 11 and PLO #1, 2, 3, 4, 5]

Program Learning Outcomes (PLO)

1. Demonstrate understanding of the fundamental principles, concepts, and terminology of biology.
2. Explain structures and fundamental processes of life at molecular, cellular, and organismal levels.
3. View the living world with greater understanding, insight, and appreciation as it relates to the field of biology and contemporary problems and issues.
4. Demonstrate the ability to apply the scientific method of inquiry to gather and use information for the purposes of critical thinking, information analysis, and problem solving.
5. Exhibit proficiency in the laboratory and in the field by using standard equipment and measurement and observation techniques that allow one to gather, analyze, and interpret qualitative data.

Course-specific Institutional Learning Goals (ILG):

Institutional Learning Goal 1. Written and Oral Communication in English. Students will communicate effectively in both speech and writing.

Institutional Learning Goal 2. Mathematics. Students will use appropriate mathematical and statistical concepts and operations to interpret data and to solve problems.

Institutional Learning Goal 3. Science. Students will use the scientific method of inquiry, through the acquisition of scientific knowledge.

Institutional Learning Goal 4. Technology. Students will use computer systems or other appropriate forms of technology to achieve educational and personal goals.

Institutional Learning Goal 5. Social Science. Students will use social science theories and

concepts to analyze human behavior and social and political institutions and to act as responsible citizens.

Institutional Learning Goal 7. History. Students will understand historical events and movements in World, Western, non-Western, or American societies and assess their subsequent significance.

Institutional Learning Goal 8. Diversity and Global Perspective: Students will understand the importance of a global perspective and culturally diverse peoples.

Institutional Learning Goal 9. Ethical Reasoning and Action. Students will understand ethical frameworks, issues, and situations.

Institutional Learning Goal 10. Information Literacy: Students will recognize when information is needed and have the knowledge and skills to locate, evaluate, and effectively use information for college level work.

Institutional Learning Goal 11. Critical Thinking: Students will use critical thinking skills understand, analyze, or apply information or solve problems.

Units of Study in Detail – Unit Student learning Outcomes:

Unit I The Nature of Ecology [Supports SLO #1, 2, 3, 6, 7]

Learning Objectives

The student will be able to:

- Develop an understanding of ecology and how it is the study of relationships between organisms and their environment.
- Identify how ecological systems form a hierarchy.
- Investigate nature using the scientific method.
- Evaluate the ties between ecology and other disciplines.

Unit II Climate [Supports Course SLO #1, 2, 3, 7]

Learning Objectives

The student will be able to:

- Develop an understanding of seasonal variation with solar radiation and how the earth intercepts solar radiation.
- Determine why air temperature decreases with altitude and how temperature influences moisture content of air.
- Discuss earth's rotation on wind and ocean currents.
- Discuss global patterns of air circulation, ocean currents, and precipitation.
- Evaluate the influence of topography and microclimates on organism distribution.

Unit III The Aquatic Environment [Supports Course SLO #1, 2, 3, 4, 5, 6, 7]

Learning Objectives

The student will be able to:

- Understand how the hydrologic cycle links all marine and freshwater aquatic ecosystems.
- Identify water's distinctive properties and how this result from its structure.
- Determine why light, temperature, and oxygen levels all generally decrease with water depth.

Unit IV The Terrestrial Environments [Supports Course SLO #1, 2, 3, 4, 5, 6, 7]

Learning Objectives

The student will be able to:

- Discuss major constraints imposed on organisms by the transition from water to land.
- Determine how plants are the dominant factor determining the vertical gradient of light.

- Understand soil's importance, weathering, and its formation.
- Identify the distinguishing physical properties of soil.
- Evaluate a profile, water-holding, and ion exchange capacities of soil types.

Unit V Plant Adaptations to the Environment [Supports SLO #1, 2, 3, 4, 5, 6, 7]

Learning Objectives

The student will be able to:

- Discuss photosynthesis along with its importance, stages, and alternative pathways.
- Evaluate net photosynthesis, respiration, light, CO₂ uptake, and water movement by plants.
- Evaluate plant adaptations to variations in light, precipitation, temperature, nutrients, and wetland environments.

Unit VI Animal Adaptations to the Environment [Supports SLO #1, 2, 3, 4, 5, 6, 7]

Learning Objectives

The student will be able to:

- Describe why animals require essential amino acids, minerals, O₂, and homeostatic conditions.
- Evaluate animal adaptations to acquiring and digesting food.
- Discuss animal adaptations to maintain internal body temperature.
- Discuss animal adaptations to maintain water balance.
- Identify animal adaptations to daily and seasonal photoperiods.

Unit VII Life History [Supports SLO #1, 2, 3, 4, 5, 6, 7]

Learning Objectives

The student will be able to:

- Compare asexual and sexual reproduction and forms of sexual reproduction.
- Describe types of animal mating systems and sexual selection of females.
- Discuss how reproductive effort varies in timing, parental care, fecundity, latitude, and with habitat selection.

Unit VIII Properties of Populations [Supports SLO #1, 2, 3, 4, 5, 6, 7]

Learning Objectives

The student will be able to:

- Discuss the importance and identify population properties, such as geographic range, density, spatial distribution, and dispersal.
- Demonstrate techniques for counting and sampling population sizes and densities.
- Describe the importance of a populations age structures and sex ratio.

Unit IX Interspecific Competition [Supports SLO #1, 2, 3, 4, 5, 6, 7]

Learning Objectives

The student will be able to:

- Discuss how interspecific competition involves multiple species vying for the same limited resource.
- Analyze how the outcome of interspecific competition is affected by a variety of factors.
- Identify how interspecific competition influences a species niche and natural selection.

Unit X Predation [Supports SLO #1, 2, 3, 4, 5, 6, 7]

Learning Objectives

The student will be able to:

- Understand that predation is the consumption of all or part on one living organism by another.
- Evaluate how foraging involves decisions about the allocation of time and energy.
- Identify the various predator defenses that are exhibited by different prey species.
- Describe how predators have evolved different hunting methods to overcome predator defenses.
- Identify plant adaptations to avoid or deter predation by herbivores.

Unit XI Parasitism and Mutualism [Supports SLO #1, 2, 3, 4, 5, 6, 7]

Learning Objectives

The student will be able to:

- Discuss how parasites exploit their hosts for food, habitat, and dispersal.
- Understand the main types and adaptations of hosts to minimize impacts of parasites.
- Identify characteristics of mutualism and discuss this as a type of symbiosis beneficial to both species.
- Investigate the differences and similarities between symbiotic and nonsymbiotic mutualisms.

Unit XII Community Structure [Supports SLO #1, 2, 3, 4, 5, 6, 7]

Learning Objectives

The student will be able to:

- Investigate the richness, relative abundance, and types of species in a community.
- Discuss food chains, food webs, and trophic levels in a community.
- Determine physical structure and zonation in a community.

Unit XIII Community Dynamics [Supports SLO #1, 2, 3, 4, 5, 6, 7]

Learning Objectives

The student will be able to:

- Evaluate the process of primary and secondary ecological succession.
- Discuss autogenic and allogenic changes in environmental conditions.
- Determine patterns of species diversity and succession.

Evaluation of student learning:

Questions on exams are from lecture, lecture assignments, reading assignments, handouts, or other material presented. It is the student's responsibility to be present and on time for all exams. Absence constitutes a zero score on any missed exam. Each exam can be taken one time only and there normally will be no make-ups. In the case of an emergency, the student must contact the instructor within 24 hours. Grades are based on the total accumulation of earned points. All exams covering the lecture and textbook material, homework, quizzes, in-class graded activities, all laboratory writing assignments, and presentations contribute to the total number of possible points.

Assignment	Number @ point value	Total Point Value
Lecture Quizzes	10 @ 10 points	100 points
Lecture Tests	4 @ 100 points each	400 points
Homework Assignments	5 @ 10 points each	50 points
Lecture Discussion Participation	50 points	50 points

Lab Writing Assignments	4 @ 25 points each	100 points
Presentation	50 points	50 points
Field Work Participation	50 points	50 points
TOTAL POINTS		800 points
Final Grade =	(Total points / 8)	

A	93-100%	B+	87-89%	C+	77-79%	D	60-69%
A-	90-92	B	83-86	C	70-76	F	<60%
		B-	80-82				