

University of Arkansas – Fort Smith
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General Syllabus

BIOL 3403 Ecology

Credit Hours: 3

Lecture Hours: 3

Laboratory Hours:0

Prerequisite: STAT 2503 Probability and Statistics I and one of the following: BIOL 2303/2301 General Botany /Laboratory or BIOL 2503/2501 General Microbiology /Laboratory or BIOL 2703/2701 General Zoology /Laboratory.

Prerequisite or corequisite: BIOL 3401 Ecology Laboratory

Effective Catalog: 2018- 2019

I. Course Information

A. Catalog Description

Broad overview of the interactions between organisms and their environment, and the interactions between various organisms. Special emphasis on how humans affect populations, communities, and the biosphere.

II. Student Learning Outcomes

A. Subject Matter

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

1. Evaluate and articulate how organisms interact with one another and with their environment.
2. Explain the role of abiotic and biotic factors of the environment in the distribution, abundance, growth and dynamics of populations.
3. Analyze and discuss the nature and dynamics of ecological communities and ecosystems.
4. Assess the effects humans have had on global ecology with particular emphasis on landscapes, the biosphere and climate changes; suggest courses of action and theorize future consequences.

B. University Learning Outcomes

Analytical Skills

Critical Thinking Skills: Students will identify a problem or issue, and research, evaluate, and compare information from varying sources in order to evaluate authority, accuracy, recency, and bias relevant to the problems/issues.

Communication Skills (written and oral)

Students will effectively communicate scientific ideas and principles. Students will compose scientifically sound reports and communicate their research findings in a public or departmental setting.

III. Major Course Topics

- A. Natural history: life on land and water
 - 1. Terrestrial biomes
 - 2. Temperature, atmospheric circulation, and precipitation
 - 3. Climate diagrams
 - 4. Aquatic environments
- B. Ecology at the level of individuals: effect of temperature, water, energy, and nutrients, and social relations
 - 1. Temperature regulation by plants
 - 2. Temperature regulation by ectothermic animals
 - 3. Temperature regulation by endothermic animals
 - 4. Water regulation on land
 - 5. Water and salt balance in aquatic environments
 - 6. Main sources of energy for living organisms
 - 7. Energy limitation
 - 8. Optimal foraging theory
 - 9. Sexual selection
 - 10. Sociality
- C. Distribution, abundance, dynamics, and nature of populations
 - 1. Population characteristics
 - 2. Distributional patterns
 - 3. Commonness and rarity
 - 4. Dispersal
 - 5. Patterns of survival
 - 6. Age distribution
 - 7. Population growth patterns
- D. Inter- and intraspecific interactions among organisms: competition, exploitation, and mutualism
 - 1. Resource competition
 - 2. Development of the niche concept
 - 3. Mathematical and laboratory models of competition
 - 4. Types of exploitative interactions
 - 5. Types of mutualism
- E. Nature and dynamics of communities and ecosystems: species diversity, food webs, energy production and flow, nutrient cycling, succession and stability
 - 1. Measuring species richness, abundance, and diversity

2. The relationship between environmental disturbance and diversity
 3. Species interactions and community structure
 4. Community webs
 5. Keystone species
 6. Patterns of terrestrial primary production
 7. Patterns of aquatic primary production
 8. Trophic level concept
 9. The distribution and cycling of nutrients in ecosystems
 10. Community changes during succession
 11. Ecosystem changes during succession
 12. Mechanisms underlying succession
 13. Patterns of community stability and their causes
- F. Global, landscape, and geographical ecology, with emphasis on human effects.