



Syllabus

BIO 221 Principles of Aquatic and Terrestrial Ecology

General Information

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Department Conservation

Course Prefix BIO

Course Number 221

Course Title Principles of Aquatic and Terrestrial Ecology

Dual Listing (also listed as): CON 202

Course Information

Catalog Description This course is designed for second year students in Horticulture and Conservation degree programs. An introduction to the scientific study of the interactions between organisms and their environment. Students examine the influence of biotic and abiotic variables on species evolution, population dynamics, and community composition. Students are required to conduct an independent field study to integrate and reinforce ecological concepts learned throughout the degree program.

Credit Hours 3

Lecture Contact Hours 3

Lab Contact Hours 0

Other Contact Hours 0

Grading Scheme Letter

Prerequisites

ENG 101 Composition I AND BIO 121 General Biology I OR BIO 125 Foundations of Life Science; minimum grade C-

Co-requisites

None

First Year Experience/Capstone Designation

This course **DOES NOT** satisfy the outcomes applicable for status as a FYE or Capstone.

SUNY General Education

This course is designated as satisfying a requirement in the following SUNY Gen Ed categories

None

FLCC Values

Institutional Learning Outcomes Addressed by the Course

Inquiry, Perseverance, and Interconnectedness

Course Learning Outcomes

Course Learning Outcomes

1. Explain ecological concepts using appropriate terminology
2. Apply ecological concepts to explain observed patterns (spatial and temporal) in community structure and function
3. Practice technical writing skills
4. Integrate information from appropriate sources (primary and secondary)

Outline of Topics Covered

- I. Introduction to Ecology**
 - I. Definition**
 - II. Hierarchical Level of Ecology**
 - III. Scientific method**
 - IV. Observation/Manipulation experiments**
 - V. Data and Graph interpretation**
- II. Climate**
 - I. Global Climate Patterns (e.g. Hadley Cells, Coriolis Effect, Thermohaline Circulation)**
 - II. Regional Climate Modifications (e.g. elevation, aspect, lake effect snow, orographic effect, upwelling, monsoons, etc.)**
- III. Soils**

- I. **Soil Forming Factors**
- II. **Soil Horizons**
- III. **Soil Texture and Properties**

- IV. **Aquatic Systems**
 - I. **Water's Chemical and Physical Properties (e.g. covalent and hydrogen bonds, polarity, viscosity, cohesion, etc.)**
 - II. **Lentic vs. Lotic**
 - III. **Stream Orders**
 - IV. **Seasonal Stratification and Mixing**
 - V. **Eutrophic vs. Oligotrophic**
 - VI. **Vertical and Horizontal Zones**

- V. **Community Ecology**
 - I. **Community Composition and Structure**
 - II. **Relative Abundance**
 - III. **Species Diversity Concepts and Equations**
 - IV. **Succession**
 - V. **Individualistic (Gleason) vs. Closed (Clements) Community Modes**

- VI. **Biomes**
 - I. **Characteristic Climatic**
 - II. **Edaphic and Biological Properties of Eight Major Biomes (i.e. tropical rainforests, deserts, savannah, chaparral, temperate deciduous forest, temperate grassland, taiga, and tundra)**

- VII. **Evolution**
 - I. **Mechanisms of Evolution (Natural Selection, Mutations, Selective Mating, Migration, Genetic Drift)**
 - II. **Eco-Types**
 - III. **Phenotypic Plasticity**

- VIII. **Plant & Animal Adaptations**
 - I. **Autotrophs vs. Heterotrophs**
 - II. **Photosynthesis (light reaction and Calvin Cycle)**
 - III. **Photosynthetic Pathways (C3, C4, CAM)**
 - IV. **Plant and Animal Adaptations in Response to Different Selective Pressures (e.g. low light, low oxygen, low moisture, hot/cold temperature)**
 - V. **Different Animal Adaptations for Energy and Nutrient Consumption (i.e. feeding strategies and digestive tracts) and Maintaining Homeostasis (e.g. ectothermy vs. endothermy)**

- IX. **Life History Traits**
 - I. **Sexual vs. Asexual**
 - II. **Sexual Forms (i.e. monoecious, dioecious, synoecious)**

- III. **Mating Systems (e.g. monogamy, polygamy)**
- IV. **Intrasexual Selection vs. Intersexual Selection**
- V. **Altricial vs. Precocial**
- VI. **R-Selection vs. K-Selection Strategies**
- X. **Population Ecology**
 - I. **Properties of Populations**
 - II. **Population Growth Models (i.e. exponential and logistics)**
 - III. **Intraspecific Population Regulation Dynamics**
- XI. **Species Interactions**
 - I. **Types of Species Interactions**
 - II. **Fundamentals vs. Realized Niche**
 - III. **Interspecific Competition**
 - IV. **Predation**