Syllabus

BIO 221 Principles of Aquatic and Terrestrial Ecology

General Information

Date  September 13th, 2023
Author  Maura Sullivan
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, temperature 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, syneocious)
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