BIO 221 Principles of Aquatic and Terrestrial Ecology

General Information

Date
May 20th, 2020

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

Credit Hours
3

Lecture Contact Hours
3

Lab Contact Hours
0

Other Contact Hours
0

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.

Prerequisites
BIO 121 or BIO 125

Co-requisites
None

Grading Scheme
Letter

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 category
None
Institutional Learning Outcomes Addressed by the Course

Inquiry       Perseverance       Interconnectedness

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)

Program Affiliation

This course is required as a core program course in the following program:
AAS Fish and Wildlife Technology, AAS Horticulture, AAS Natural Resources Conservation, AAS Natural Resources Conservation Law Enforcement, and AS Environmental Studies

Outline of Topics Covered

I. Introduction to Ecology
   1. Definition
   2. Hierarchical Level of Ecology
   3. Scientific method
   4. Observation/Manipulation experiments
   5. Data and Graph interpretation

II. Climate
   1. Global Climate Patterns (e.g. Hadley Cells, Coriolis Effect, Thermohaline Circulation)
   2. Regional Climate Modifications (e.g. elevation, aspect, lake effect snow, orographic effect, upwelling, monsoons, etc.)

III. Soils
   1. Soil Forming Factors
   2. Soil Horizons
   3. Soil Texture and Properties

IV. Aquatic Systems
   1. Water's Chemical and Physical Properties (e.g. covalent and hydrogen bonds, polarity,
viscosity, cohesion, etc.)

2. Lentic vs. Lotic
3. Stream Orders
4. Seasonal Stratification and Mixing
5. Eutrophic vs. Oligotrophic
6. Vertical and Horizontal Zones

V. Community Ecology
1. Community Composition and Structure
2. Relative Abundance
3. Species Diversity Concepts and Equations
4. Succession
5. Individualistic (Gleason) vs. Closed (Clements) Community Modes

VI. Biomes
1. Characteristic Climatic
2. 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
1. Mechanisms of Evolution (Natural Selection, Mutations, Selective Mating, Migration, Genetic Drift)
2. Eco-Types
3. Phenotypic Plasticity

VIII. Plant & Animal Adaptations
1. Autotrophs vs. Heterotrophs
2. Photosynthesis (light reaction and Calvin Cycle)
3. Photosynthetic Pathways (C3, C4, CAM)
4. Plant and Animal Adaptations in Response to Different Selective Pressures (e.g. low light, low oxygen, low moisture, hot/cold temperature)
5. 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
1. Sexual vs. Asexual
2. Sexual Forms (i.e. monoecious, dioecious, synoecious)
3. Mating Systems (e.g. monogamy, polygamy)
4. Intrasexual Selection vs. Intersexual Selection
5. Altricial vs. Precocial
6. R-Selection vs. K-Selection Strategies

X. Population Ecology
   1. Properties of Populations
   2. Population Growth Models (i.e. exponential and logistics)
   3. Intraspecific Population Regulation Dynamics

XI. Species Interactions
   1. Types of Species Interactions
   2. Fundamentals vs. Realized Niche
   3. Interspecific Competition
   4. Predation