NOVA COLLEGE-WIDE COURSE CONTENT SUMMARY
BIO 270 – GENERAL ECOLOGY (4 CR.)

Course Description

Studies interrelationships between organisms and their natural and cultural environments with emphasis on populations, communities, and ecosystems.
Lecture 3 hours. Recitation and laboratory 3 hours. Total 6 hours per week.

General Course Purpose

This is a one semester course designed to build upon the student's understanding of the basic principles and concepts of ecology attained in prerequisite courses. It serves as a lab science option. It is intended to prepare students for major's level coursework in ecology and evolution.

Course Prerequisites/Corequisites

Prerequisites: Any two of the following prerequisites: BIO 101, BIO 102, BIO 110, BIO 120

Course Objectives

- Scientific Literacy
  - Critically evaluate readings to determine their validity and relevance.
- Quantitative Reasoning
  - Perform accurate calculations, interpret scientific data and graphs, and use results to support conclusions.
  - Analyze data collected through experiments in lab. Present and discuss the findings and conclusions derived from data, with chart/spreadsheet and graphs.
  - Use mathematical models to simulate ecological interactions and make predictions. Interpret graphs and tables generated by the models.
- Critical Thinking
  - Discriminate among degrees of credibility, accuracy, and reliability of inferences drawn from given data. Determine when conclusions are supported by the information provided.
- Introduction to Ecology and Evolution
  - Explain science as a way of knowing about the world. Compare and contrast ecology, environmental science, and environmentalism.
  - Explain how ecologists using scientific methods to study the world at different levels of interaction.
  - Explain the general trends in the physical environment on Earth (e.g., latitude, elevation, seasons, convection currents).
  - Compare and contrast the major terrestrial and aquatic biomes found on Earth.
  - Explain the concept of a niche.
  - Compare and contrast different modes of evolution.
  - Explain how mathematical models can be used by ecologists.
  - Use the Hardy-Weinberg principle to determine whether a population is evolving
- Physiological and Behavioral Ecology
  - Explain the difference between conformers and regulators, including advantages/disadvantages of each approach.
  - Compare and contrast the ways organisms deal with temperature.
  - Compare and contrast the ways organisms deal with water availability.
  - Compare and contrast the ways organisms deal with energy availability.
  - Compare and contrast the ways organisms deal with nutrient availability.
  - Compare and contrast the ways organisms interact socially.
- Population Ecology
  - Explain how ecologists measure size and density of various populations.

    - Use a life table to understand and make predictions about a population.
    - Compare and contrast various models of population growth.
    - Compare and contrast the three types of survivorship curves.
    - Explain density-dependent and density-independent effects.
    - Explain how life history theory is applied to population ecology.
    - Explain how populations may be better modeled as metapopulations.
- Population Interactions
    - Describe the difference between fundamental and realized niches.
    - Compare and contrast various outcomes of niche overlap.
    - Describe the competitive exclusion principle.
    - Use competition models to show how the outcome of competition depends on characteristics of the species and the environment.
    - Use predator-prey models to make
    - Compare and contrast functional responses.
    - Describe strategies employed by species (predators/prey, herbivores/plants, and parasites/hosts) in consumptive relationships.
    - Explain mutualism, including when such a relationship would be likely to be an evolutionary stable strategy.
- Community Ecology
    - Explain how ecologists measure diversity within a community.
    - Interpret a rank abundance curve.
    - Calculate species diversity.
    - Explain the concept of species succession and relate it to the biomes discussed in Unit 1.
    - Explain the role of disturbance, stability, and resilience in ecological succession.
    - Explain how the theory of island biogeography applies to community ecology.
- Ecosystem Ecology
    - Explain the various roles in a food web.
    - Compare and contrast the movement of energy and nutrients through a food web.
    - Compare and contrast primary and secondary productivity.
    - Compare and contrast competition and apparent competition.
    - Explain how indirect relationships affect species within a community.
    - Explain the concept of keystone species.
    - Compare and contrast bottom-up and top-down control in a community.
    - Explain the concept of a trophic cascade.
- Conservation Ecology
    - Explain the reason that ecologists may be concerned with anthropogenic changes.
    - Explain how overharvesting can lead to species extinction.
    - Explain the role of habitat loss on ecological communities.
    - Explain the role of pollution on species extinction.
    - Explain how anthropogenic climate change affects ecosystems.
    - Explain how invasive species disrupt communities.
    - Explain how the theory of island biogeography can be applied to terrestrial landscapes.
    - Apply ecological principles to human populations.

Major Topics to be Included

- Introduction to Ecology and Evolution
- Physiological and Behavioral Ecology
- Population Ecology
- Population Interactions
- Community Ecology
- Ecosystem Ecology
- Conservation Ecology