

BIO-106L: ENVIRONMENT, ECOLOGY, & EVOLUTION LABORATORY

Cuyahoga Community College

Viewing: BIO-106L : Environment, Ecology, & Evolution Laboratory

Board of Trustees:

MARCH 2024

Academic Term:

Fall 2024

Subject Code

BIO - Biology

Course Number:

106L

Title:

Environment, Ecology, & Evolution Laboratory

Catalog Description:

Designed for non-science majors. Questions about the natural world are explored through hands-on laboratory and field activities focusing on evolution, ecology, and environmental science. Scientific inquiry is used to investigate how populations change over time; the diversity of life; community ecology; ecosystem ecology; and human impacts on the environment.

Credit Hour(s):

1

Lecture Hour(s):

0

Lab Hour(s):

3

Other Hour(s):

0

Requisites

Prerequisite and Corequisite

ENG-0995 Applied College Literacies, or appropriate score on English Placement Test. Concurrent enrollment in BIO-1060 Environment, Ecology, and Evolution is strongly recommended.

Note: ENG-0990 Language Fundamentals II taken prior to Fall 2021 will also meet prerequisite requirements.

Outcomes

Course Outcome(s):

Apply the process of scientific inquiry to explore questions about the natural world.

Objective(s):

1. Distinguish among an observation, hypothesis, experiment, conclusion and theory.
2. Use scientific inquiry to write a hypothesis, design and perform an experiment to test predictions of the hypothesis, collect and analyze data, and draw inferences from the results.
3. Demonstrate appropriate use of scientific equipment, including a microscope, balances, volumetric glassware, etc.
4. Distinguish between observations and inferences.

Course Outcome(s):

Analyze how populations change genetically over time through the process of evolution resulting in the unity and diversity of life.

Objective(s):

1. Identify and distinguish among the domains, kingdoms, and major phyla of life.
2. Describe and apply the effects of environmental changes on a sample population.

Course Outcome(s):

Analyze the relationships and interactions between living things and their environment.

Objective(s):

1. Map the paths of major chemical elements in biogeochemical cycles.
2. Analyze and explain a population growth curve.
3. Identify different types of community interactions.
4. Construct a food chain and analyze the flow of energy through trophic levels.

Course Outcome(s):

Evaluate causes, explain effects, and propose solutions regarding human impact on the environment in order to make informed environmental decisions in daily life.

Objective(s):

1. Demonstrate the effects of human activities on selected aquatic and/or terrestrial ecosystems.
2. Identify local, regional and global environmental concerns.
3. List current approaches to conservation and sustainability of our earth and its natural resources.
4. Analyze a personal water and/or carbon footprint.

Methods of Evaluation:

- a. In-class experiments
- b. Lab practicals
- c. Lab reports/assignments
- d. Review analyses
- e. Individual or group presentations
- f. Quizzes
- g. Posters

Course Content Outline:

- a. Science as a process
 - i. Observations
 - ii. Hypotheses
 - iii. Experimental design, including data, variables, and controls
 - iv. Conclusions
 - v. Scientific use of the word "theory"
 - vi. Microscopy
 - vii. Measurements
 - viii. Graphing
- b. Population genetics
- c. Evolutionary processes
 - i. Natural selection
 - ii. Mutation
 - iii. Genetic drift
 - iv. Gene flow
 - v. Nonrandom mating
 - vi. Adaptations
- d. Evidence for evolution
 - i. Fossil record
 - ii. Comparative anatomy

- iii. Molecular biology
 - iv. Biogeography
- e. Classification of Life
 - i. Dichotomous keys
- f. Population ecology
 - i. Distribution
 - ii. Growth
 - iii. Survivorship
 - iv. Demography
- g. Community ecology
 - i. Food webs
 - ii. Predator-prey interaction
 - iii. Competition
 - iv. Symbiosis
 - v. Succession
- h. Ecosystem ecology
 - i. Terrestrial biomes
 - ii. Aquatic ecosystems
 - iii. Biogeochemical cycles
 - iv. Energy flow
- i. Human population growth
- j. Effects of pollution
- k. Human impacts on ecosystems
 - l. Local/regional environmental concerns
- m. Terrestrial biomes/aquatic ecosystems
- n. Taxonomy
 - i. Domains
 - ii. Kingdoms
 - iii. Major Animal Phyla and Plant Divisions
 - iv. Major Arthropod Classes
 - v. Major Vertebrate Classes
- o. Tools and skills of biology
 - i. Use a microscope
 - ii. Take measurements using the metric system
 - iii. Formulate hypotheses
 - iv. Design a controlled experiment
 - v. Graph data
 - vi. Construct a dichotomous key
 - vii. Assign organisms to appropriate taxa
 - viii. Draw and interpret a growth curve.
 - ix. Estimate population size
 - x. Mark and recapture study
 - xi. Quadrat analysis
 - xii. Graph population data
 - xiii. Use various environmental sampling techniques to collect data.
- p. Science versus non-science
 - i. Science as a process
 - ii. Evolution as a scientific theory
 - iii. Changing classification categories
 - iv. Interconnectedness
 - v. Populations change over time
 - vi. Sustainability
 - vii. Tragedy of the commons
 - viii. Sustainability
 - ix. Stewardship
 - x. Biodiversity

- xi. Conservation
- xii. Renewable and non-renewable resources

Resources

Mader, Sylvia. (2022) *Inquiry into Life Laboratory Manual*, McGraw-Hill.

Adams, Byron J. and John Crawley. (2018) *Van De Graaf's Photographic Atlas for the Biology Laboratory*, Englewood: Morton Publishing.

ODNR Office of Coastal/Management. (2018) *Ohio Coastal Atlas*, ODNR Office of Coastal/Management. <https://ohiodnr.gov/discover-and-learn/safety-conservation/about-ODNR/coastal-management/ohio-coastal-mgmt-program/ohio-coastal-atlas-documents>

OpenStax College. (2023) *Concepts of Biology*, Houston: OpenStax. <https://openstax.org/details/books/concepts-biology>

Hoefnagels, Marielle. (2021) *Biology the Essentials*, New York: McGraw-Hill.

Hoefnagels, Marielle. (2020) *Biology: Concepts and Investigations*, New York: McGraw-Hill.

Audesirk, G. (2016) *Biology: Life on Earth*, Illinois: Pearson.

Anna Sher and Manuel Molles. (2021) *Ecology: Concepts and Applications*, McGraw Hill.

Cunningham. (2023) *Environmental Science: A Global Concern*, McGraw Hill.

Resources Other

- a. *American Field Guide - PBS*. http://www.pbs.org/americanfieldguide/teachers/native_species/native_species_sum.html
- b. *Becoming Human*. <http://www.pbs.org/wgbh/evolution/>
- c. *CIA World Fact Book*. <https://www.cia.gov/library/publications/the-world-factbook/>
- d. *Evolution and the Nature of Science Institutes*. <http://www.indiana.edu/~ensiweb/home.html>
- e. *PBS Evolution*. <http://www.pbs.org/wgbh/evolution/>
- f. *Population Reference Bureau*. <http://www.prb.org/>
- g. *U.S. and World Population Clocks - U.S. Census Bureau*. <http://www.census.gov/main/www/popclock.html>

Instructional Services

OAN Number:

Ohio Transfer 36 TMNS

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