Minnesota State University Moorhead

BIOL 115: Organismal Biology

A. COURSE DESCRIPTION

Credits: 4

Lecture Hours/Week: 3

Lab Hours/Week: 3

OJT Hours/Week: *.*

Prerequisites: None

Corequisites: BIOL 115L and BIOL 115L

MnTC Goals: Goal 03 - Natural Science

This course is designed for biology majors. The course will address biological diversity, primarily in plants and animals. Organismal diversity will be presented within an evolutionary context. Relationships between form and function as well as relationships of organisms to their environments will be addressed. Lab included. MnTC Goal 3L.

B. COURSE EFFECTIVE DATES: 05/04/2004 - Present

C. OUTLINE OF MAJOR CONTENT AREAS

1. Nature of science and the scientific method.
2. Connection of biological processes with natural life in the field
   i. Multiple data collection activities based at the MSUM Regional Science Center
   a. Diversity and variation
   b. Plant host parasite interactions
   ii. Participation in the MSUM bird banding program
3. Evolution by Natural Selection
   i. Debunking myths about evolution by natural selection
   ii. Evidences in support of evolutionary theory
   iii. Modes of selection
   iv. Sources of genetic variation
   v. Micro- and macroevolution
4. Phylogeny and cladistics systematics.
5. The evolutionary basis for the organization of biodiversity of organisms.
6. Nomenclature of taxonomic classification.
7. Prokaryotic diversity.
8. Protist diversity.
9. Unicellular to multicellular transition.
10. Plant diversity
    i. Water to land transition
    ii. Evolution of vascular tissue
    iii. Evolution of seeds
    iv. Evolution of flowers
11. Fungal diversity.
12. Metazoan body plans: symmetry, coelom, germ layers, fate of blastopore
    i. Protostomia: Porifera, Cnidaria, Mollusca, Annelida, Arthropoda
    ii. Deuterostomia: Echinodermata, Chordata
    iii. Evolution of the Vertebrata
    a. Jaws, paired appendages
    b. Amnion, rotated girdles, homeothermy
    c. Human evolution
13. Behavioral ecology of organisms
    i. Evolution of behavior
    ii. Gene by environment interaction
    iii. Sexual selection theory
    iv. Application of behavioral theory to human behavior
14. Population ecology of organisms
    i. Population estimates
    ii. Population distribution patterns
    iii. Population growth curves (exponential, logistic growth)
    iv. Lotka-Volterra predator-prey cycling
15. Community ecology of organisms
    i. Classification of species interactions
    ii. Island biogeography
    iii. The concept of niche, competition, character displacement, ghost of competition past
16. Ecosystem ecology of organisms
    i. Nutrient cycling
    ii. Food webs
    iii. Top-down / bottom-up effects (biomagnification, keystone species)
    iv. Ecological succession
17. Biosphere ecology of organisms
    i. Global carbon budget
    ii. Greenhouse gases, global warming, ocean acidification

D. LEARNING OUTCOMES (General)

1. Understand the mechanics of evolution by natural selection.
2. Understand the organization of biodiversity as a reflection of past evolutionary processes.
3. Connect biological theory presented in the classroom with real life organisms in the field.
4. Know the major groups of organisms and the characteristic traits that define them.
5. Understand the scientific method.
6. Be able to apply the scientific method to problems in organismal biology.
7. Be able to collate data, construct a graph of treatments means ± SE in excel.
8. Be able to make conclusions from data drawn from statistical inference.
9. Know the distinction between primary literature and secondary sources of information.
10. Be able to search, retrieve and cite relevant sources of primary literature.
11. Be able to produce a written report that adheres to the format conventions of scientific writing.
12. Design and execute an experiment.
13. Present an oral presentation of their research findings to their peers.

E. Minnesota Transfer Curriculum Goal Area(s) and Competencies

Goal 03 - Natural Science

1. Demonstrate understanding of scientific theories.
2. Formulate and test hypotheses by performing laboratory, simulation, or field experiments in at least two of the natural science disciplines. One of these experimental components should develop, in greater depth, students' laboratory experience in the collection of data, its statistical and graphical analysis, and an appreciation of its sources of error and uncertainty.
3. Communicate their experimental findings, analyses, and interpretations both orally and in writing.
4. Evaluate societal issues from a natural science perspective, ask questions about the evidence presented, and make informed judgments about science-related topics and policies.

F. LEARNER OUTCOMES ASSESSMENT

As noted on course syllabus

G. SPECIAL INFORMATION

None noted