Des Moines Area
Community College

Course Competency Information

Effective Date: Fall 2007

Acronym/Number: BIO 113
Historical Reference: General Biology II

Course Title: General Biology II
Credit Breakout: 4.00 Lecture, 3.00 Lab, 1.00 Practicum, 0 Work Experience

Prerequisite/Co-Requisite
Prerequisite: BIO-112, Prerequisite: H.S. biology and H.S. chemistry or equivalent

Description
Second semester of biology for majors. Topics covered include fungi, plants, animals and ecology.

Course Competencies

1. Comply with safety and health rules
   1. Demonstrate appropriate safety procedures for the laboratory
   2. Locate safety equipment in the laboratory room
2. Demonstrate laboratory techniques
   1. Use a microscope
   2. Prepare slides for microscopic examination
   3. Explain experimental results
   4. Write lab reports
   5. Distinguish among laboratory supplies
   6. Prepare solutions
   7. Show competence in the use of laboratory equipment
3. Describe characteristics of fungi
   1. Distinguish between divisions of fungi
   2. Name anatomical features of fungi
   3. Differentiate between saprobic, parasitic and mutualistic modes of nutrition in fungi.
   4. Discuss the economic and ecological significant of fungi
   5. Describe modes of reproduction and dispersal used by fungi
   6. Describe characteristics of lichens
4. Examine the diversity of seedless plants
   1. Describe the alternation of generation life cycle in plants
   2. Compare the nonvascular plants to vascular plants and the seedless vascular plants to seed plants
   3. Describe the moss life cycle
   4. Discuss the ecological and economic significance of mosses
   5. Describe the fern life cycle
5. Examine the diversity of seed plants
   1. Discuss several reproductive adaptations of the seed plants
   2. Describe the relationship between the gametophyte and the sporophyte in seed plants.
   3. Describe the life cycle of a pine tree
   4. Describe the structure of an angiosperm flower
   5. Describe the life cycle of an angiosperm, including the process of double fertilization
   6. Differentiate between monocots and dicots
7. Explain the mutualistic association between flowering plants and animals.
8. Discuss the importance of angiosperms to agriculture and industry
9. Discuss strategies that can be employed to conserve plant diversity

6. Discuss plant structure and growth
   1. Differentiate between monocots and dicots
   2. Differentiate between rhizomes, stolons, tubers and bulbs
   3. Describe the structure and function of parenchyma, collenchyma and sclerenchyma cells
   4. Describe the structure and function of tracheids, vessel elements, sieve tube members, and companion cells
   5. Compare apical meristems to lateral meristems and primary growth to secondary growth
   6. Describe the organization of tissues in a plant leaf
   7. Discuss the function of the vascular cambium and cork cambium
   8. Differentiate between springwood and summerwood
   9. Compare the heartwood of a tree to the sapwood

7. Discuss transport in plants
   1. Discuss the osmotic movement of a water plant cell when it is immersed in a hypertonic solution and a hypotonic solution
   2. Describe three pathways by which water and minerals move from the soil solution into the root xylem
   3. Explain long distance transport of water and solutes in a tree
   4. Discuss the role of endodermis and Casparian strip in the movement of substances into the root xylem
   5. Explain the ascent of xylem sap in a tree by the transpirational pull – cohesion – tension mechanism
   6. Explain the photosynthesis – transpiration compromise that characterizes plant metabolism
   7. Explain the mechanism by which the stomata open and close
   8. List several adaptations that xerophytes have to reduce transpiration
   9. Discuss the seasonal changes in translocation in trees

8. Discuss plant nutrition
   1. Differentiate between macronutrients and micronutrients
   2. Compare the properties of sandy soils to clayey soils.
   3. List several functions of humus
   4. Discuss the role of organisms in maintaining the health of the soil
   5. Describe the process of cation exchange between soils and plant roots
   6. Compare conventional agriculture to sustainable agriculture
   7. Describe the role of ammonifying bacteria, nitrogen-fixing bacteria, nitrifying bacteria and denitrifying bacteria in the nitrogen cycle
   8. Describe the relationship between plant roots and Rhizobium bacteria
   9. Describe the relationship between mycorrhizae and plant roots.

9. Discuss plant reproduction
   1. Trace the alternation of generations in the life cycle of a plant.
   2. Describe the process of double fertilization in angiosperms
   3. Describe the structure of the mature seed
   4. Identify the components of the mature dicot embryo
   5. Describe the development of a fleshy fruit
   6. List several factors that may cause plants to break seed dormancy
   7. Describe vegetative reproduction in plants by means of fragmentation
   8. Describe how cultivars are cloned through tissue culture techniques
   9. Discuss the role of sexual and asexual reproduction in the life history of wild plants

10. Discuss plant responses
    1. List several characteristics of hormones
    2. Discuss the relationship between auxin and phototropism
    3. Explain the acid-growth hypothesis of cell elongation
    4. Describe how the ratio of auxin to cytokinin influences shoot and root growth.
    5. Discuss the role of hormones in signal-transduction pathways
    6. Discuss responses of plants to gravity, mechanical stimuli, drought, flooding, salt, heat and cold
    7. Describe several mechanisms that plants use to defend themselves against herbivores and pathogens

11. Discuss animal evolution
    1. Trace the general pattern of embryological development in animals
    2. Describe key features of the parazoa, eutmetazoa, radiate-bilateria, acoelomate, psuedocoelomate-
coelomate and protostome – deuterostome grades of animal evolution
3. Differentiate between determinate and indeterminate development
4. Discuss the relationship between bilateral symmetry and cephalization
12. Discuss invertebrate diversity
   1. Describe the dimorphic life cycle of cnidarians
   2. List several features of Phylum Platyhelminthes, Mollusca, and Nematoda
   3. What is the significance of the well-developed circulatory system of cephalopods.
   4. Discuss the significance of segmentation in Phylum Annelida
   5. Compare an open circulatory system to a closed circulatory system
   6. Describe several key features of the arthropod exoskeleton
   7. Compare complete metamorphosis to incomplete metamorphosis in insects.
   8. List several key features of Class Crustacea
   9. List several key features of Phylum Echinodermata
   1. Describe ecosystems
   2. Outline population interactions.
   3. Discuss environmental concerns
   4. Describe relationships of organisms with environment
14. Examine population ecology
   1. Explain types of population growth.
   2. Identify factors that regulate population growth
15. Examine community ecology
   1. Discuss symbiotic relationships
   2. Describe the process of ecological succession
16. Examine ecosystem ecology
   1. Discuss adaptations to abiotic factors
   2. Describe biogeochemical cycles
   3. Discuss energy flow in ecosystems
   4. Describe biomes
   5. Discuss environmental issues