

HIBBING COMMUNITY COLLEGE COURSE OUTLINE

COURSE NUMBER & TITLE: BIOL 1520 - General Biology of Animals & Plants

CREDITS: 5 (Lecture 4 / Lab 1)

PREREQUISITES: College Level Reading

CATALOG DESCRIPTION:

General Biology of Animals & Plants is one of a two-course sequence in general biology. This course stresses the organism level of biological organization. Morphology, physiology, taxonomy, natural history, evolution and ecology of animals and plants are stressed. General Biology of Animals & Plants is intended for students planning further studies in biology or in medically-related fields as well as liberal arts studies. MNTC goal areas: (3)Natural Science and (10)People and the Environment.

OUTLINE OF MAJOR CONTENT AREAS:

- I. Kingdoms of life
 - A. Prokaryotes
 - B. Protista
 - C. Mycota
 - D. Plants
 - E. Animals
- II. Animal body organization
 - A. Levels of organization and complexity
 - B. Integuments of various groups
 - C. Body support and skeletal systems
 - D. Animal movement
- III. Internal fluids
 - A. Open systems
 - B. Closed systems
 1. Hearts
 2. Circulatory systems
 3. Blood pigments
 4. Respiration strategies
 5. Defense mechanisms
- IV. Digestion and nutrition
 - A. Nutritional requirements
 - B. Feeding mechanisms
 - C. Digestion
 1. Carbohydrate digestion
 2. Protein digestion
 3. Fat digestion

- D. Alimentary canal organization
- V. Homeostasis
 - A. Temperature regulation
 - B. Osmotic regulation
 - 1. Invertebrate excretory structures
 - 2. Vertebrate kidneys
- VI. Nervous coordination
 - A. Neurons and nerve physiology
 - B. Synapses
 - C. Reflexive behavior
 - D. Central nervous system
 - 1. Motor centers
 - 2. Sensory centers
 - 3. Autonomic regulation
 - E. Special sense organs
- VII. Hormonal control of animal behavior
- VIII. Muscles
 - A. Types of muscle cells
 - B. Musculoskeletal arrangements
 - C. Muscle physiology
- IX. Reproduction
 - A. Mitosis and asexual reproduction
 - B. Meiosis and sexual reproduction
 - 1. Spermatogenesis and oogenesis
 - 2. Variation and natural selection within species
 - 3. Determination of sex
- X. Survey of animal phyla; structures and natural history
 - A. Animal-like protists
 - B. Porifera
 - C. Cnidaria
 - D. Ctenophora
 - E. Platyhelminthes
 - F. Nematoda
 - G. Rotifera
 - H. Mollusca
 - I. Annelida
 - J. Arthropoda
 - K. Echinodermata
 - L. Chordata
 - 1. Agnatha
 - 2. Chondrichthyes
 - 3. Osteichthyes
 - 4. Amphibia
 - 5. Reptilia
 - 6. Aves
 - 7. Mammalia

- XI. The development of plant study in biology
 - A. Application of scientific methods
 - B. Diversity of fields within botany
- XII. Plant morphology
 - A. Plant tissues
 - 1. Stems
 - 2. Roots and soils
 - 3. Leaves
 - B. Reproductive structures
 - 1. Flowers
 - 2. Fruits
 - 3. Seeds and germination
- XIII. Plant physiology
 - A. Water in plants
 - 1. Transport mechanisms
 - 2. Water regulation
 - 3. Mineral requirements
 - B. Photosynthesis
 - 1. Light and chlorophyll
 - 2. Biochemical reactions
 - C. Growth regulation
 - 1. Plant hormones
 - 2. Photoperiodism
 - 3. Biotechnology techniques
- XIV. Natural history and life cycles
 - A. Alternation of generations
 - B. Genetic variation
 - 1. Natural selection
 - 2. Hybridization
- XV. Basis of plant taxonomy
 - A. Non-plant kingdoms
 - 1. Bacteria and blue-green algae
 - 2. Algae (phycology)
 - 3. Mushrooms, molds, and cup fungi
 - 4. Lichens
 - B. The plant kingdom
 - 1. Bryophytes; liverworts and mosses
 - 2. Tracheophytes
 - a. Ferns and fern allies
 - b. Gymnosperms
 - c. Angiosperms
 - 3. Taxonomic keys and plant identification
 - 4. Major families of flowering plants
- XVI. Ecology
 - A. Energy flow and food chains
 - B. Population dynamics

- XVII. Plant ecology
 - A. Communities
 - B. Plant interactions
 - C. Succession
 - D. Fire ecology
 - E. Exotic species
- XVIII. Evolution
 - A. A Darwinian view of life
 - B. Evolution of populations
 - C. Tracing phylogeny
 - D. Evolution of seed plants
 - E. Diversity of eukaryotes
 - F. Invertebrate evolution
 - G. Vertebrate evolution

COURSE GOALS/OBJECTIVES/OUTCOMES:

The student will

1. match living organisms to the kingdom to which they belong.
2. describe the advantages and disadvantages of the various animal body coverings and support systems.
3. explain the advantages to an animal of cellular differentiation within the framework of cellular similarity.
4. diagram and describe the circulatory systems of animals from any phylum,
5. list the blood cells responsible for immune responses and describe the function of each.
6. diagram and describe the systems necessary to maintain osmotic balance in animals from any phylum.
7. diagram and describe the strategies for oxygen distribution in animals from any phylum.
8. diagram and explain systems for nutrient distribution in animals from any phylum.
9. describe nerve physiology on a chemical level.
10. describe muscle physiology on a chemical level.
11. explain selected animal behaviors in terms of neuromuscular reflex.
12. locate and describe the function of the major regions of their brain.
13. correlate the nervous, muscular, and sensory abilities of selected animals with their behavior and natural history.
14. explain the advantages and disadvantages of the various reproductive strategies of animals.
15. match any animal to its proper phylum, and selected animals to their proper class and order.
16. describe the natural histories of selected animal groups.
17. correlate animal behavior and natural histories to practices and choices which affect good human health.
18. describe physical adaptations of animals that allow them to function in their natural habitats.

19. list adaptations of animals that are superior and inferior to those of human adaptations.
20. describe the roles of animals in terms of ecological dynamics.
21. explain factors that may lead to extinction of animal groups.
22. identify the contributions of botany and the major botanical disciplines to history, medicine, and the biological sciences.
23. describe and list functions of the meristematic, conductive, and dermal tissues present in all plant structures.
24. describe the primary and specialized functions of roots.
25. contrast the stems of herbaceous and woody plants.
26. explain the differences among leaves and how they are adapted for specific functions.
27. diagram the developmental relationship among flowers, fruits, and seeds.
28. explain the uses, transport, and regulation of water in plants.
29. explain in detail the light and dark reactions of photosynthesis.
30. identify plant hormones and their regulation of growth, differentiation, and development.
31. relate the importance of alternation of generation to the reproductive success of plants.
32. solve simple genetic problems and trace the origins of genetic variation in plant populations.
33. summarize the applications and limitations of genetic engineering.
34. relate the role of hybridization and the process of natural selection in the development of new species.
35. construct and use a dichotomous key to categorize and identify plant species.
36. outline the major taxonomic groups of plants based on morphology.
37. list the important plant products unique to each taxonomic division.
38. explain the modification of plants as adaptations to the environment.
39. list and explain the interactions of plants with their environment.
40. give examples of how plants influence and are influenced by changes in the ecosystem.
41. summarize the observations and field research that led Darwin to his evolutionary theories.
42. explain natural selection in populations as a dependent of genetic variation and environmental changes.
43. describe the mechanisms of speciation and the causes of extinction.
44. relate the diversity of organisms to the adaptive changes in metabolism and morphology.
45. give examples and evaluate the systems used to assign which species are most closely related.

MNTC GOALS AND COMPETENCIES MET:

Natural Sciences

People and the Environment

HCC COMPETENCIES MET:

Working Productively and Cooperatively
Communicating Clearly and Effectively
Thinking Creatively and Critically

STUDENT CONTRIBUTIONS:

Students are expected to attend all lecture and laboratory sessions, participate in and contribute to class discussions, complete all assignments on time, and request assistance when needed. Attendance is critical for the successful completion of this course. Students must confine laboratory activities to only those assigned and are required to follow all safety rules. Protective equipment will be provided.

METHODS FOR EVALUATING STUDENT LEARNING:

Student evaluation will be on the basis of cumulative points gained during the course. The evaluative methods are written examinations, quizzes, writing exercises, journal article analysis, laboratory notebooks and exams, case study exercises, class participation, and data collection and evaluation.

SPECIAL INFORMATION:

Biology 1520 requires college level reading and the ability to function physically in laboratory and outdoor settings. The course includes use of microscopes, small sharp instruments, glassware, heat sources, and live animals. Students will be exposed to chemical preservatives. All students will be expected to abide by all laboratory safety procedures as distributed to students prior to the initial laboratory session.

AASC APPROVAL DATE: February 25, 2014
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REVIEW DATE: February 2019

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