

Common Course Outline for: BIOL 1502 Principles of Biology II

A. Course Description

1. Number of credits: 4
2. Lecture hours per week: 3
Lab hours per week: 3
3. Prerequisites: BIOL 1501 (C or higher)
4. Co-requisites: None
5. MnTC Goal: 3

This course is the second in a sequence designed for students majoring in biology and other science related fields, including the health professions. Students will explore the evolution and diversity of organisms and their interactions with each other and the environment. Students will engage in techniques appropriate to the study of diverse organisms and their interactions and gain experience in experimental design, data analysis and interpretation, and the communication of results. This course meets a requirement for the Biology (Minnesota State Transfer Pathway) AS-P degree, and is the prerequisite for BIOL 2202, 2203, 2205, 2206, 2207, and 2208. Lecture 3 hours per week. Lab 3 hours per week.

B. Date last revised: August 2019

C. Outline of Major Content Areas

Lecture: Subtopics listed under each main topic may vary due to recent developments in the field and current events.

1. Darwinian evolution
 - a. Historical perspectives regarding Darwinian evolution
2. Modern synthesis
 - a. Review of cell cycle and mitosis and meiosis
 - b. Review of Mendelian and molecular genetics
 - c. Genetic variation
 - d. Hardy-Weinberg principle
 - e. Forms of selection
 - f. Microevolution
3. Origin of species
 - a. Divergence
 - b. Reproductive isolation
 - c. Adaptive radiation
 - d. Biological species concept
4. Macroevolution
5. Evidence of evolution

6. Diversity
 - a. Archaea
 - b. Eubacteria
 - c. Protista
 - d. Fungi
 - e. Plantae
 - f. Animalia
7. Population ecology
 - a. Demography
 - b. Life history
 - c. Population growth models
8. Community ecology
 - a. Stability and diversity
 - b. Coevolution and symbiosis
 - c. Species interactions
 - d. Ecological succession
 - e. Island biogeography
9. Ecosystem ecology
 - a. Biogeochemical cycles
 - b. Trophic levels
 - c. Energy flow
 - d. Climate
 - e. Major biomes
 - f. Aquatic ecosystems
10. Paleoecology
 - a. Plate tectonics
 - b. Geologic time
 - c. Geology of Minnesota
 - d. St. Paul brickyards – Ordovician sea floor

Laboratory: Students will actively participate in lab by engaging in studies related to:

1. Microscopy
2. Principles of ecology
 - a. Population growth
 - b. Species interactions
 - c. Succession
3. Mechanisms of evolution
 - a. Mutation
 - b. Proteomics
4. Evolutionary history of biological diversity, reproduction and development
 - a. Systematics
 - b. Phylogenetics
 - c. Bacteria and Archaea
 - d. Protista
 - e. Plants
 - f. Fungi

g. Animals

D. Course Learning Outcomes

Upon successful completion of the course, the student will be able to:

1. Understand and apply knowledge of plant biology, animal biology, evolution and diversity, and ecology. (2a, 3a)
2. Recall, explain, and apply concepts, knowledge, and vocabulary of biology at the level necessary for success in subsequent biology courses for science majors. (2a, 3a)
3. Demonstrate understanding of scientific theories in biology. (3a)
4. Demonstrate quantitative reasoning skills at a level appropriate for subsequent courses in biology for science majors. (2a, 3b)
5. Distinguish between and demonstrate appropriate use of primary and secondary scientific literature. (2a, 3a)
6. Formulate and test hypotheses by performing laboratory experiments in biology that include the collection of data, statistical analysis, graphical presentation of results, and interpretation of sources of error and uncertainty. (2a, 2b, 2c, 2d, 3b)
7. Communicate experimental findings both orally and in writing. (3c)
8. Understand and apply knowledge of the use of the microscope and other biological laboratory equipment, and apply that knowledge in the proper conduct and interpretation of laboratory investigations. (2a, 2b, 2c, 2d, 3a, 3b)
9. Describe current biological issues and research and evaluate societal issues in a biological context. (2a, 2b, 2c, 2d, 3a, 3d)

E. Methods for Assessing Student Learning

A variety of evaluation and assessments methods will be used including, but not limited to, the following:

1. Written examinations (multiple choice, true-false, fill-in-the-blank, matching, short answer, and critical thinking questions)
2. Short-writes or pop-quizzes
3. Graphing exercises
4. Work sheets
5. Problems
6. Laboratory reports
7. Written assignments or papers
8. A final comprehensive exam

F. Special Information

The laboratory portion of the course is delivered in the Biology Learning Center (BLC). The BLC has its own set of operating policies and procedures. An instructor will include the most recent version of the Departmental and Biology Learning Center Policies in the course syllabus.

One or more labs require the use of Biosafety Level 2 standards.

Laboratory procedures require the handling, treatment, manipulation, and killing of living organisms including but not limited to sea urchins, vinegar eels, and bacterial cultures there are no exceptions or alternate activities.