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Biology (BIOL)1510 Fundamentals of Biology with Lab (4 Units) CSU:UC

Advisory: Eligibility for English 1500 strongly recommended

Total Hours: 48 hours lecture; 48 hours lab (96 hours total)

Catalog Description: This course consists of both lecture and laboratory components that will survey the principles of biology, including cell theory, cell division, heredity, evolution, and anatomy/physiology of plants and animals. The course also includes a survey of the principle groups of plants and animals. This course is a non-majors life science course.

Type of Class/Course: Degree Credit

Text: Johnson, George B. *The Living World*. 11th ed. Boston: McGraw-Hill, 2024.

Enger, Eldon D. and Frederick C. Ross. *Laboratory Manual: Concepts in Biology*. 14th ed. Boston: McGraw, 2011. Print.

Additional Required Materials: None

Course Objectives:

At the conclusion of this course, the student should be able to:

1. possess a general introduction to biology,
2. develop the fundamental principles of biology as illustrated by plants and animals,
3. develop an understanding of the scientific method,
4. develop the ability to make critical observations,
5. develop an understanding of their interaction with their biological environment, and
6. develop practical laboratory experiences in the life sciences.

Course Scope and Content (Lecture):

- Unit I The Study of Life
- A. The Science of Biology
 - B. The Scientific Process
- Unit II The Living Cell
- A. The Chemistry of Life

- B. Molecules of Life
- C. Cells
- D. Energy and Life
- E. Photosynthesis
- F. How Cells Harvest energy from Food

Unit III The Continuity of Life

- A. Mitosis
- B. Meiosis
- C. Foundations of Genetics
- D. Genetic Material
- E. How Genes Work

Unit IV The Evolution and Diversity of Life

- A. Evolution and Natural Selection
- B. Classification of Organisms
- C. Prokaryotes and Viruses
- D. Protists
- E. Fungi

Unit V Plant Life

- A. Evolution of Plants
- B. Plant form and function

Unit VI Evolution of Animal Life

- A. Evolution of the Animal Phyla
- B. History of the Vertebrates
- C. How Humans Evolved

Unit VII Animal Life

- A. Circulation
- B. Respiration
- C. Digestion
- D. Nervous System
- E. Reproduction and Development

Unit VIII The Living Environment

- A. Populations and Communities
- B. Ecosystems
- C. Behavior and the Environment
- D. How Humans Influence the Living World

Course Scope and Content (Laboratory):

- Unit I The Scientific Method and Metric Measurements
A. Metric measurements
B. Metric conversions
- Unit II Diffusion and Osmosis
A. Differentiate between diffusion and osmosis
B. Kinetic energy and concentration effects
- Unit III The Microscope
A. Using a compound microscope
B. Preparing wet mount slides
- Unit IV Cell Structure and Function
A. Viewing organisms from 5 Kingdoms
B. Identifying cell structures and organelles
- Unit V DNA and RNA
A. DNA replication, transcription, translation
B. DNA purification
- Unit VI Mitosis – Cell Division
A. Cell cycle phase
B. Microscopic examination of cell division in plants and animals
- Unit VII Genetics & Human Variation
A. Single and double factor crosses
B. Dominant and recessive human phenotypes
- Unit VIII Reproduction & Development
A. Human reproduction stages
B. Development of frog and fish eggs
- Unit IX Plant Tissues
A. Structure and function of plant organs
B. Reproduction of plants
- Unit X Frog Dissection
A. Identification of vertebrate organs and structures
B. Function of frog and fish eggs
- Unit XI Animal Diversity
A. Phylogeny
B. Animal Evolution
- Unit XII Visit to Los Angeles County Natural History Museum or Los Angeles Zoo
A. Examine non-native species of plants and animals in a live context

Learning Activities Required Outside of Class:

The students in this class will spend a minimum of 6 hours per week outside of the regular class time



doing the following:

1. Studying text, chapter handouts and learning objectives,
2. Answering questions,
4. Completing required reading,
5. Problem solving activity or exercise, and
6. Written work.

Methods of Instruction:

1. Assigned readings from text and selected references,
2. Lecture and demonstration by instructor,
3. Multimedia presentations,
4. Field trips, and
5. Hands-on laboratory exercises.

Methods of Evaluation:

1. Writing assignments, including:
 - a. Essays,
 - b. Laboratory reports, and
 - c. Scientific research paper.
2. Computational or non-computational problem-solving demonstrations, including:
 - a. Exams,
 - b. Homework problems,
 - c. Quizzes, and
 - d. Laboratory reports.
3. Other examinations, including:
 - a. Multiple-choice,
 - b. Matching items,
 - c. True/false items, and
 - d. Completion.

Laboratory Category: Extensive Laboratory

Pre delivery criteria: All of the following criteria are met by this lab.

1. Curriculum development for each lab.
2. Published schedule of individual laboratory activities.
3. Published laboratory activity objectives.
4. Published methods of evaluation.
5. Supervision of equipment maintenance, laboratory setup, and acquisition of lab materials and supplies.

During laboratory activity of the laboratory: All of the following criteria are met by this lab.

1. Instructor is physically present in lab when students are performing lab activities.
2. Instructor is responsible for active facilitation of laboratory learning.
3. Instructor is responsible for active delivery of curriculum.
4. Instructor is required for safety and mentoring of lab activities.
5. Instructor is responsible for presentation of significant evaluation.



Post laboratory activity of the laboratory: All of the following criteria are met by this lab.

1. Instructor is responsible for personal evaluation of significant student outcomes (lab exercises, exams, practicals, notebooks, portfolios, etc.) that become a component of the student grade that cover the majority of lab exercises performed during the course.
2. Instructor is responsible for supervision of laboratory clean up of equipment and materials.