BIOL A100: PRINCIPLES OF BIOLOGY

Item	Value
Curriculum Committee Approval Date	12/08/2021
Top Code	040100 - Biology, General
Units	4 Total Units
Hours	108 Total Hours (Lecture Hours 54; Lab Hours 54)
Total Outside of Class Hours	0
Course Credit Status	Credit: Degree Applicable (D)
Material Fee	Yes
Basic Skills	Not Basic Skills (N)
Repeatable	No
Open Entry/Open Exit	No
Grading Policy	Standard Letter (S)
Associate Arts Local General Education (GE)	• Area 5 Physical and Biological Sciences, Scientific Inquiry, Life Science (OB)
Associate Science Local General Education (GE)	• Area 5 Physical and Biological Sciences, Scientific Inquiry, Life (OSB)
California General Education Transfer Curriculum (Cal-GETC)	• Cal-GETC 5B Biological Sciences (5B) • Cal-GETC 5C Laboratory Activity (5C)
Intersegmental General Education Transfer Curriculum (IGETC)	• IGETC 5B Biological Sciences (5B) • IGETC 5C Laboratory Activity (5C)
California State University General Education Breadth (CSU GE-Breadth)	• CSU B2 Life Science (B2) • CSU B3 Laboratory Activity (B3)

Course Description

A general study of life processes with emphasis on biological chemistry, cells, molecular biology, heredity, ecology, evolution, and the diversity of life. Suitable as a general education elective for the non-science major. Enrollment Limitation: BIOL A100H; students who complete BIOL A100 may not enroll in or receive credit for BIOL A100H. Transfer Credit: CSU; UC: Credit Limitation: No credit for BIOL A100 or BIOL A100H if taken after BIOL A180.

Course Level Student Learning Outcome(s)

1. Identify the cellular components and cellular functioning of the various domains of life.
2. Solve genetic problems and determine the genotype and phenotype outcomes of a genetic trait cross.
3. Identify the major taxonomic groups of organisms and compare and contrast their major characteristics.
4. Identify the various mechanisms by which organisms evolve and the mechanisms by which new species are formed.
5. Analyze the interactions between organisms and the interactions between organisms and their environment.

Course Objectives

- 1. Properly use glassware (pipette, graduated cylinder) and other pieces of equipment (spectrophotometer, top-loading balance, microscope).
- 2. Follow experimental procedures and use scientific reasoning to analyze results.
- 3. Use the metric system and analyze line, trend and bar graphs.
- 4. Design multiple experiments to test a scientific question.
- 5. Prepare, stain, and properly use a wet-mount slide, as well as prepared slides.
- 6. Compare and contrast various types of cells and identify the major cellular components.
- 7. Predict the movement of molecules through a plasma membrane based on variables, such as solute concentration gradient, and molecular size.
- 8. Describe the characteristics and importance of molecules necessary for life.
- 9. Describe chemical reactions such as photosynthesis, cellular respiration, and other metabolic pathways.
- 10. Compare and contrast the process and function of mitotic and meiotic cell division.
- 11. Assess inheritance patterns and use punnett squares to make predictions about offspring genotypes/phenotypes.
- 12. Describe the difference between DNA and RNA and explain the process of protein synthesis.
- 13. Use the theory of evolution and natural selection to explain the diversity of life.
- 14. Describe how organisms interact with each other and their environment and conduct and design a field experiment to measure interactions.
- 15. Identify and distinguish the diversity of living organisms on Earth.

Lecture Content

Lecture Topics (not necessarily covered in this order) Importance of Scientific Literacy for Non-science majors Biological Principles of Life; Levels of Biological Organization Importance of Chemistry for Life; Characteristics of Biological Molecules The Cell as a Living Unit; Variations in Cell Structure Characteristics of the Plasma Membrane Diffusion, Osmosis, Active Transport, other Transport Methods for Large Molecules Energy Capture and Transfer: Photosynthesis and Glucose Catabolism Cellular Division: Mitosis vs. Meiosis Basic Genetics: Chromosomes, Replication and Inheritance Patterns Reproductive Strategies Protein Synthesis and the molecular functioning of cells Molecular biological techniques and their application to modern biological problems Human Biology Physiology of common organisms Natural Selection, Evolution and Speciation Diversity of Life Organisms and their Environment; ecology and animal behavior

Lab Content

Laboratory Experiments Using Scientific reasoning in Problem Solving and Experimental Design Scientific measurements and tools Molecules and chemical reactions Cell Anatomy and Physiology Cell Types

Metabolism Photosynthesis Plant Anatomy and Physiology (e.g., vascular tissues, roots, stem, leaves) Animal anatomy Physiology (e.g., circulatory system, digestion system) Cell Division: Mitosis vs. Meiosis Reproduction Strategies Genetics Natural Selection and Evolution Diversity of Organisms Organisms and their Environment

Method(s) of Instruction

- Lecture (02)
- DE Live Online Lecture (02S)
- DE Online Lecture (02X)
- Lab (04)
- DE Live Online Lab (04S)
- DE Online Lab (04X)

Instructional Techniques

Lecture, demonstration, laboratory and field-based experiments, video presentations, discussions, and problem solving

Reading Assignments

As assigned from text. Estimated combined two (2) hours of independent work outside of class for each unit/weekly lecture hour from reading assignments, out-of-class assignments, and writing assignments.

Writing Assignments

Laboratory reports require written descriptions of graphs, analytical questions of concepts and procedures, and mathematical calculations. Optional assignments in lecture may include written summaries of scientific articles, seminars, fieldwork, and flow charts to apply concepts to additional applications. Estimated combined two (2) hours of independent work outside of class for each unit/weekly lecture hour from reading assignments, out-of-class assignments, and writing assignments.

Out-of-class Assignments

Optional assignments in lecture will include written summaries of scientific articles, seminars, fieldwork, and flow charts to apply concepts to additional applications. Estimated combined two (2) hours of independent work outside of class for each unit/weekly lecture hour from reading assignments, out-of-class assignments, and writing assignments.

Demonstration of Critical Thinking

Written laboratory reports, laboratory quizzes, multiple lecture examinations, optional written reports.

Required Writing, Problem Solving, Skills Demonstration

Laboratory reports require written descriptions of graphs, analytical questions of concepts and procedures, and mathematical calculations. Optional assignments in lecture may include written summaries of scientific articles, seminars, fieldwork, and flow charts to apply concepts to additional applications.

Eligible Disciplines

Biological sciences: Master's degree in any biological science OR bachelor's degree in any biological science AND master's degree in biochemistry, biophysics, or marine science OR the equivalent. Master's degree required.

Textbooks Resources

1. Required Elliott, Kelli Goerrissen, Jan. Biology 100 Laboratory Manual, Latest ed. Hayden-Mcneil, 2022 Rationale: - 2. Required Hoefnagles, Marielle. Biology: Concepts and Investigations, 5th ed. McGraw Hill, 2021 3. Required Taylor, Martha R., Simon, Eric J., Dickey, Jean L., Kelly A. Hogan. Campbell Biology: Concepts and Connections, 10th ed. Pearson, 2020