Course Title: AP Biology

Course #: 1561-1562

Course Description: AP Biology is an introductory college-level biology course. Students cultivate their understanding of biology through inquiry-based investigations as they explore the following topics: evolution, cellular processes, energy and communication, genetics, information transfer, ecology, and interactions. The course is lab-based and focuses on application of concepts. *Students are strongly encouraged to take the AP Exam in May.*

UC/CSU Approval: "d" approved

Grade Level: 10-12

Estimated Homework Per Week: Approximately 6-8 hrs, depending on student skill level, including all course preparation such as assigned work and individual studying

Prerequisite: Completion of Biology or Biology Honors with a grade of “B” or higher AND Completion of Chemistry or Chemistry Honors with a grade of “B” or higher

Recommended Prerequisite Skills: None

Course Grade Scale:
- Class Assignments/Homework: 10%
- Labs & Projects: 25%
- Tests & Quizzes: 50%
- Semester Exams: 15%

Major Assessments/Units/Topics:

Big Idea 1: Evolution
The process of evolution drives the diversity and unity of life.

Big Idea 2: Cellular Processes: Energy and Communication
Biological systems utilize free energy and molecular building blocks to grow, to reproduce, and to maintain dynamic homeostasis.

Big Idea 3: Genetics and Information Transfer
Living systems store, retrieve, transmit, and respond to information essential to life processes.

**Big Idea 4: Interactions**

Biological systems interact, and these systems and their interactions possess complex properties.

To understand the four Big Ideas, the curriculum emphasizes inquiry-based learning. Students develop advanced reasoning skills through the following Science Practices:

- Explain biological concepts, processes, and models presented in written format.
- Analyze visual representations of biological concepts and processes.
- Determine scientific questions and methods.
- Represent and describe data.
- Perform statistical tests and mathematical calculations to analyze and interpret data.
- Develop and justify scientific arguments using evidence.

(Please note that pacing, labs, and activities are subject to change)

**Fall Semester**

**UNIT 0: COURSE INTRODUCTION**

Readings in *Biology in Focus 2e*:

- Chapter 1-Introduction: Evolution and the Foundations of Biology
- Chapter 2-The Chemical Context of Life
- Chapter 19-Descent with Modification  **QUIZZAM #1**

Activities/Labs:

- Properties of Water: How many drops of water fit on a penny?
- Birds and Worms

**UNIT I: ORGANIC CHEMISTRY AND CELL BIOLOGY**

Readings in *Biology in Focus 2e*:

- Chapter 3-Carbon and the Molecular Diversity of Life
- Chapter 4-A Tour of the Cell
- Chapter 5.1-5.5-Membrane Transport and Cell Signaling  **TEST #1**

Activities/Labs

- Macromolecules Activity
Investigative Lab #4: Diffusion and Osmosis

UNIT II: CELLULAR PROCESSES
Readings in *Biology in Focus 2e*:
- Chapter 6-An Introduction to Metabolism
- Chapter 7-Cellular Respiration and Fermentation
- Chapter 8-Photosynthesis **TEST #2**
- Chapter 9-The Cell Cycle **QUIZZAM #2**

Activities/Labs:
- Respiration and Photosynthesis Model Creation
- Investigative Lab #5 Photosynthesis
- Investigative Lab #6 Cellular Respiration (online lab)
- Investigative Lab #13: Enzyme Activity
- M&M Chi Square (with onion root lab results)

UNIT III: GENETICS/MOLECULAR BIOLOGY
Readings in *Biology in Focus 2e*:
- Chapter 10-Meiosis and Sexual Life Cycles
- Chapter 11-Mendel and the Gene Idea
- Chapter 12-The Chromosomal Basis of Inheritance **TEST #3**
- Chapter 13-The Molecular Basis of Inheritance
- Chapter 14-Gene Expression: From Gene to Protein

Activities/Labs:
- Sickle Cell HHMI Activity
- Meiosis on the Table Activity
- Investigative Lab #7: Mitosis and Meiosis (online; and slide viewing)

**SEMESTER EXAM** (inclusive of all chapters listed above; including 13-14)
Spring Semester
UNIT III: GENETICS/MOLECULAR BIOLOGY (continued)

- Chapter 15-Regulation of Gene Expression
- Chapter 16-Development \textbf{QUIZZAM #1}

Activities/Labs:
- Investigative Lab #9: Biotechnology: Restriction Enzyme Analysis of DNA (PCR and gel analysis)

UNIT IV: Evolution

Readings in \textit{Biology in Focus 2e}:

- Chapter 20-Phylogeny \textbf{TEST #1}
- Chapter 21-Evolution of Populations
- Chapter 22-Origin of the Species
- Chapter 23-Broad Patterns of Evolution
- Chapter 24.1-.3-Early Life and the Diversification of Prokaryotes. \textbf{TEST #2}

Activities/Labs:
- Investigative Lab #2: Hardy Weinberg (PTC)
- Investigative Lab #3: Analyzing Genes with BLAST
- Investigative Lab #8: Biotechnology: Bacterial Transformation (Amgen Biotechnology Experience, Lab 5)

UNIT VI: ECOLOGY

Readings in \textit{Biology in Focus 2e}:

- Chapter 39.3-.6-Motor Mechanisms and Behavior
- Chapter 40-Population Ecology \textbf{TEST #3}
- Chapter 41-Species Interactions
- Chapter 42-Ecosystems and Energy
- Chapter 43-Global Ecology and Conservation Biology \textbf{SEMESTER EXAM} (cumulative for the year, taken before the AP Exam in May)
Activities/Labs:

- Investigative Lab #11: Transpiration
- Investigative Lab #12: Animal Behavior Lab with Isopods
- HHMI Trophic Cascades

**AP Biology Exam: May**

**UNIT VII: LABS, PROJECTS, AND PRESENTATIONS**

To be determined based on student interests