

## **AP Biology**

UC/CSU "d" approved/NCAA approved

Grade Level: 10-12

Estimated Work Outside of Class: 6-8 hrs per week

### **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.*

### **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:**

Strong ability to read complex scientific scenarios and scientific papers. Strong ability to analyze complex data sets and draw appropriate conclusions. Strong writing skills are highly recommended. Course curriculum is projected to be completed by the end of March with April dedicated to test review, so students should feel comfortable with the fast pace of the course. Homework estimation per week is dependent upon the student's reading and writing skills in a technical subject.

### **Course Grade Categories:**

- Class Assignments/Homework: 10%
- Labs & Projects: 35%
- Assessments: 55%

### **Major Assessments/Units/Topics:**

#### ***Fall Semester***

#### **UNIT I: INTRODUCTION/CHEMISTRY OF LIFE**

Readings in *Biology in Focus* 3e:

- Chapter 1-Introduction: Evolution and the Foundations of Biology
- Chapter 2-The Chemical Context of Life
- Chapter 3-Carbon and the Molecular Diversity of Life
- Chapter 19-Descent with Modification
- Introduction to statistical analysis (Standard deviation, standard error of the mean, normal curve)

#### Activities/Labs

- Macromolecules Activity
- Properties of Water: Surface Tension, hydrogen bonding, adhesion/cohesion
- Birds and Worms

### **UNIT II: CELL STRUCTURE AND FUNCTION**

Readings in *Biology in Focus* 3e:

- Chapter 4-A Tour of the Cell
- Chapter 5.1-5.5-Membrane Transport

#### Activities/Labs:

- Investigative Lab #4: Diffusion and Osmosis
- Cell Bubble Membrane Investigation

### **UNIT III: CELLULAR ENERGY**

Readings in *Biology in Focus* 3e:

- Chapter 6- An Introduction to Metabolism
- Chapter 7- Cellular Respiration and Fermentation
- Chapter 8- Photosynthesis

#### Activities/Labs

- Respiration and Photosynthesis Model Creation
- Investigative Lab #5 Photosynthesis
- Investigative Lab #6 Cellular Respiration (online lab)
- Investigative Lab #13: Enzyme Activity (Toothpickase or Potato Catalase)

### **UNIT IV: CELL COMMUNICATION AND CELL CYCLE**

Readings in *Biology in Focus* 3e:

- Chapter 5.6 - Cell Signaling
- Chapter 9 - Cell Cycle
- Chapter 32 - The Internal Environment of Animals: Organization and Regulation

#### Activities/Labs:

- Investigative Lab #7: Mitosis (online; and slide viewing)

- M&M Chi Square (with onion root lab results)

### **SEMESTER EXAM (cumulative for the Fall Semester)**

## ***Spring Semester***

### **UNIT V: HEREDITY**

Readings in *Biology in Focus* 3e:

- Chapter 10-Meiosis and Sexual Life Cycles
- Chapter 11-Mendel and the Gene Idea
- Chapter 12-The Chromosomal Basis of Inheritance

Activities/Labs:

- Sickle Cell HHMI Activity
- Meiosis on the Table Activity

### **UNIT VI: GENE EXPRESSION AND REGULATION**

Readings in *Biology in Focus* 3e:

- Chapter 13-The Molecular Basis of Inheritance
- Chapter 14-Gene Expression: From Gene to Protein
- Chapter 15-Regulation of Gene Expression
- Chapter 16-Development

Activities/Labs:

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

### **UNIT VII: EVOLUTION**

Readings in *Biology in Focus* 3e:

- Chapter 20-Phylogeny
- 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.

Activities/Labs:

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

## **UNIT VIII: ECOLOGY**

Readings in *Biology in Focus* 3e:

- Chapter 39.3-6-Motor Mechanisms and Behavior
- Chapter 40-Population Ecology
- Chapter 41-Species Interactions
- Chapter 42-Ecosystems and Energy
- Chapter 43-Global Ecology and Conservation Biology

Activities/Labs:

- Investigative Lab #11: Transpiration
- Investigative Lab #12: Animal Behavior Lab with Isopods
- HHMI Trophic Cascades
- Investigative Lab - Simpson's Diversity Index

**SEMESTER EXAM (cumulative for the year, taken before the AP Exam in May)**

***AP Biology Exam: May***

## **UNIT IX: Real World Application of Biology**

### **LABS, PROJECTS, AND PRESENTATIONS**

To be determined based on student interests