

AP Biology builds students' understanding of biology on both the micro and macro scales. After studying cell biology, students move on to understand how evolution drives the diversity and unity of life. Students will examine how living systems store, retrieve, transmit, and respond to information and how organisms utilize free energy. The equivalent of an introductory college-level biology course, AP Biology prepares students for the AP exam and for further study in science, health sciences, or engineering.

The AP Biology course provides a learning experience focused on allowing students to develop their critical thinking skills and cognitive strategies. Frequent no- and low-stakes assessments allow students to measure their comprehension and improve their performance as they progress through each activity. Students regularly engage with primary sources, allowing them to practice the critical reading and analysis skills that they will need in order to pass the AP exam and succeed in a college biology course. Students perform hands-on labs that give them insight into the nature of science and help them understand biological concepts, as well as how evidence can be obtained to support those concepts. Students also complete several virtual lab studies in which they form hypotheses; collect, analyze, and manipulate data; and report their findings and conclusions. During both virtual and traditional lab investigations and research opportunities, students summarize their findings and analyze others' findings in summaries, using statistical and mathematical calculations when appropriate. Summative tests are offered at the end of each unit as well as at the end of each semester, and contain objective and constructed response items. Robust scaffolding, rigorous instruction, relevant material and regular active learning opportunities ensure that students can achieve mastery of the skills necessary to excel on the AP exam.

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Length: Two semesters

## UNIT 1: CELL BIOLOGY

### LESSON 1: CELL STRUCTURE AND FUNCTION

#### **Read: Cell Structure and Function**

Read about the many conserved core processes and features that are shared by all organisms.

Duration: 3 hrs 30 mins Scoring: 0 points

#### **Quiz: Cell Structure and Function**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 25 mins Scoring: 30 points

#### **Study: Cell Organelles**

Describe the specific structures and functions of various animal-cell and plant-cell organelles.

Duration: 1 hr Scoring: 0 points

#### **Quiz: Cell Organelles**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

#### **Study: When Organelles Go Astray**

Predict how interactions between and malfunctions of organelles can impact cells and organisms.

Duration: 1 hr Scoring: 0 points

### **Quiz: When Organelles Go Astray**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

### **Practice: Cell Structure and Function**

Explain conserved cellular processes, the differences between prokaryotes and eukaryotes, and how the structure of internal membranes and organelles contributes to cellular functions.

Duration: 1 hr Scoring: 25 points

### **Explore: The World's Water Problems**

Analyze and evaluate scientific evidence, and then communicate this evidence to your peers and apply it to your own experiences.

Duration: 1 hr 30 mins Scoring: 25 points

## **LESSON 2: CELL MEMBRANE STRUCTURE AND FUNCTION**

### **Read: Cell Membrane Structure and Function**

Read about how organisms exchange matter with their environment in order to grow, reproduce, and maintain organization.

Duration: 3 hrs 30 mins Scoring: 0 points

### **Quiz: Cell Membrane Structure and Function**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 25 mins Scoring: 30 points

### **Study: Calculating Surface-Area-to-Volume Ratios**

Calculate the surface areas and volumes of cells with various shapes, and analyze how surface area-to-volume ratios affect cells.

Duration: 1 hr Scoring: 0 points

### **Quiz: Calculating Surface-Area-to-Volume Ratios**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

### **Study: Water's Amazing Properties**

Explain how the biological effects of hydrogen bonding result in polarity.

Duration: 1 hr Scoring: 0 points

### **Quiz: Water's Amazing Properties**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

### **Practice: Cell Membrane Structure and Function**

Discuss how organisms exchange matter with the environment, explain how hydrogen bonding impacts biological systems, and use calculated surface area-to-volume ratios to predict which cell(s) might eliminate wastes or procure nutrients fastest by diffusion.

Duration: 1 hr Scoring: 25 points

### **Lab: Osmosis, Diffusion, and the Effects on Transpiration**

Investigate how cells maintain dynamic homeostasis.

Duration: 2 hrs 45 mins Scoring: 50 points

### **Discuss: Osmosis, Diffusion, and the Effects on Transpiration**

Discuss your findings from the lab.

Duration: 1 hr Scoring: 15 points

## **LESSON 3: CELL BIOLOGY WRAP-UP**

### **Test (CS): Cell Biology Unit Test**

Take a computer-scored test to assess what you have learned in this unit.

Duration: 1 hr Scoring: 50 points

### **Test (TS): Cell Biology Unit Test**

Take a teacher-scored test to assess what you have learned in this unit.

Duration: 1 hr Scoring: 50 points

## **UNIT 2: PROTEIN STRUCTURE AND FUNCTIONS AND THE IMPACT ON EVOLUTIONARY BIOLOGY**

### **LESSON 1: PROTEIN STRUCTURE, FUNCTION, AND SYNTHESIS**

#### **Read: Protein Structure, Function, and Synthesis**

Read about the events of protein synthesis.

Duration: 3 hrs 30 mins Scoring: 0 points

#### **Quiz: Protein Structure, Function, and Synthesis**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 25 mins Scoring: 30 points

#### **Study: Modeling Protein Synthesis**

Describe models that show how genetic information is translated into polypeptides.

Duration: 1 hr Scoring: 0 points

#### **Quiz: Modeling Protein Synthesis**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

#### **Study: Mutations and the Rise of Antibiotic Resistance**

Explain how changes in the nucleotide sequence result in mutations.

Duration: 1 hr Scoring: 0 points

#### **Quiz: Mutations and the Rise of Antibiotic Resistance**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

#### **Practice: Protein Structure, Function, and Synthesis**

Use models to predict changes in the subcomponents of a biological polymer and justify the way they affect the functionality of the molecule; discuss protein synthesis; and describe how mutations occur.

Duration: 1 hr Scoring: 25 points

#### **Explore: GFP: Lighting Up Life**

Analyze and evaluate scientific evidence, and then communicate this evidence to your peers and apply it to your own experiences.

Duration: 1 hr 30 mins Scoring: 25 points

### **LESSON 2: NATURAL SELECTION AND SPECIATION**

#### **Read: Natural Selection and Speciation**

Read about natural selection as a major mechanism of evolution.

Duration: 3 hrs 30 mins Scoring: 0 points

#### **Quiz: Natural Selection and Speciation**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 25 mins Scoring: 30 points

#### **Study: Artificial Selection**

Investigate natural selection as a major mechanism of evolution.

Duration: 1 hr Scoring: 0 points

#### **Quiz: Artificial Selection**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

#### **Study: Analyzing Patterns of Speciation**

Explain how microevolutionary change affects gene pools.

Duration: 1 hr Scoring: 0 points

#### **Quiz: Analyzing Patterns of Speciation**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

#### **Practice: Natural Selection and Speciation**

Evaluate evidence to qualitatively and quantitatively investigate the role of natural selection in evolution; discuss the impact of microevolution on gene pools; and describe how natural selection impacts evolution.

Duration: 1 hr Scoring: 25 points

#### **Lab: Hardy-Weinberg Equilibrium**

Investigate how mathematical models can be used to relate allele frequencies with evolutionary changes in populations of organisms.

Duration: 2 hrs 45 mins Scoring: 50 points

#### **Discuss: Hardy-Weinberg Equilibrium**

Analyze the data you collected and make predictions about allele frequencies and Hardy-Weinberg equilibrium in the real world.

Duration: 1 hr Scoring: 15 points

### **LESSON 3: PROTEIN STRUCTURE AND FUNCTION, AND THE IMPACT ON EVOLUTIONARY BIOLOGY WRAP-UP**

#### **Test (CS): Protein Structure and Function, and the Impact on Evolutionary Biology Unit Test**

Take a computer-scored test to assess what you have learned in this unit.

Duration: 1 hr Scoring: 50 points

#### **Test (TS): Protein Structure and Function, and the Impact on Evolutionary Biology Unit Test**

Take a teacher-scored test to assess what you have learned in this unit.

Duration: 1 hr Scoring: 50 points

## **UNIT 3: A HISTORICAL PERSPECTIVE ON THE EVIDENCE FOR EVOLUTION**

### **LESSON 1: EARTH'S HISTORY**

#### **Read: Earth's History**

Read about how biological evolution is supported by scientific evidence from many disciplines, including mathematics.

Duration: 3 hrs 30 mins Scoring: 0 points

#### **Quiz: Earth's History**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 25 mins Scoring: 30 points

#### **Study: Analyzing the Evidence for Evolution**

Evaluate the different forms of evidence for evolution and determine which is most persuasive.

Duration: 1 hr Scoring: 0 points

#### **Quiz: Analyzing the Evidence for Evolution**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

### **Study: The Early Earth**

Explain the major events in Earth's history.

Duration: 1 hr Scoring: 0 points

### **Quiz: The Early Earth**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

### **Practice: Earth's History**

Discuss how biological evolution is supported by scientific evidence, and explain the types of evidence and how they support the description of the major events in Earth's history.

Duration: 1 hr Scoring: 25 points

### **Explore: The Last Universal Ancestor**

Analyze and evaluate scientific evidence, and then communicate this evidence to your peers and apply it to your own experiences.

Duration: 1 hr 30 mins Scoring: 25 points

## **LESSON 2: EVOLUTIONARY RELATIONSHIPS**

### **Read: Evolutionary Relationships**

Read about how organisms share many conserved core processes and features that evolved over time.

Duration: 3 hrs 30 mins Scoring: 0 points

### **Quiz: Evolutionary Relationships**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 25 mins Scoring: 30 points

### **Study: Creating Cladograms and Phylogenetic Trees**

Construct a cladogram by using evidence for evolution.

Duration: 1 hr Scoring: 0 points

### **Quiz: Creating Cladograms and Phylogenetic Trees**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

### **Study: Biotechnology and the Relatedness of Organisms**

Describe the function of restriction enzymes and how they can produce recombinant DNA molecules.

Duration: 1 hr Scoring: 0 points

### **Quiz: Biotechnology and the Relatedness of Organisms**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

### **Practice: Evolutionary Relationships**

Discuss how DNA, morphological characteristics, and other evidence is used in the creation of cladographs and phylogenetic trees to describe evolutionary relationships.

Duration: 1 hr Scoring: 25 points

### **Lab: Comparing DNA Sequences to Understand Evolutionary Relationships with BLAST**

Use cladograms and bioinformatics tools to ask questions and test your ability to apply concepts relating to genetics and evolution.

Duration: 2 hrs 45 mins Scoring: 50 points

### **Discuss: Comparing DNA Sequences to Understand Evolutionary Relationships With BLAST**

Discuss and evaluate evidence provided by a data set in conjunction with a phylogenetic tree or a simple cladogram to determine evolutionary history and speciation.

Duration: 1 hr Scoring: 15 points

## **LESSON 3: A HISTORICAL PERSPECTIVE ON THE EVIDENCE FOR EVOLUTION WRAP-UP**

### **Test (CS): A Historical Perspective on the Evidence for Evolution Unit Test**

Take a computer-scored test to assess what you have learned in this unit.

Duration: 1 hr Scoring: 50 points

### **Test (TS): A Historical Perspective on the Evidence for Evolution Unit Test**

Take a teacher-scored test to assess what you have learned in this unit.

Duration: 1 hr Scoring: 50 points

## **UNIT 4: MECHANISMS OF INHERITANCE**

### **LESSON 1: CELL REPRODUCTION**

#### **Read: Cell Reproduction**

Read about how genetic information is transmitted from one generation to the next through DNA or RNA.

Duration: 3 hrs 30 mins Scoring: 0 points

#### **Quiz: Cell Reproduction**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 25 mins Scoring: 30 points

#### **Study: Modeling DNA Replication**

Provide evidence as to whether a given sample of genetic material is DNA or protein.

Duration: 1 hr Scoring: 0 points

#### **Quiz: Modeling DNA Replication**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

#### **Study: Cell Cycle, Checkpoints, and Cancer**

Predict the effects of a malfunction in the cell cycle control system.

Duration: 1 hr Scoring: 0 points

#### **Quiz: Cell Cycle, Checkpoints, and Cancer**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

#### **Practice: Cell Reproduction**

Connect concepts in and across domains to show that timing and coordination of specific events is necessary for normal development in an organism and that these events are regulated by multiple mechanisms.

Duration: 1 hr Scoring: 25 points

#### **Lab: Meiosis and Mitosis**

Use a graph or diagram to analyze situations or solve problems (quantitatively or qualitatively) that involve timing and coordination of events necessary for normal development in an organism.

Duration: 2 hrs 45 mins Scoring: 50 points

#### **Discuss: Meiosis and Mitosis**

Discuss how the cell cycle provides a mechanism for passing on genetic information to offspring and how it is controlled by the cell cycle control system.

Duration: 1 hr Scoring: 15 points

## LESSON 2: GENETICS AND GENE EXPRESSION

### Read: Genetics and Gene Expression

Read about the many biological processes involved in growth, reproduction, and dynamic homeostasis that include temporal regulation and coordination.

Duration: 3 hrs 30 mins Scoring: 0 points

### Quiz: Genetics and Gene Expression

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 25 mins Scoring: 30 points

### Study: Probability Demonstrations and Punnett Squares

Describe how Punnett squares can be used to predict genetic outcomes and how mathematical probabilities can replace the use of Punnett squares for geneticists.

Duration: 1 hr Scoring: 0 points

### Quiz: Probability Demonstrations and Punnett Squares

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

### Study: Pedigree Analysis of Human Genetic Disorders

Predict how a change in a specific DNA or RNA sequence can result in changes in gene expression.

Duration: 1 hr Scoring: 0 points

### Quiz: Pedigree Analysis of Human Genetic Disorders

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

### Practice: Genetics and Gene Expression

Describe how models can be used to predict genetic outcomes.

Duration: 1 hr Scoring: 25 points

### Explore: Embryonic Stem Cells and Gene Expression

Identify the factors necessary for cells to express genes at the appropriate times.

Duration: 1 hr 30 mins Scoring: 25 points

## LESSON 3: MECHANISMS OF INHERITANCE WRAP-UP

### Test (CS): Unit Test

Take a computer-scored test to assess what you have learned in this unit.

Duration: 1 hr Scoring: 50 points

### Test (TS): Unit Test

Take a teacher-scored test to assess what you have learned in this unit.

Duration: 1 hr Scoring: 50 points

## UNIT 5: AP BIOLOGY SEMESTER 1 EXAM

### LESSON 1: AP BIOLOGY SEMESTER 1 EXAM

#### Exam: AP Biology Semester 1 Exam

Take a computer-scored exam to demonstrate your mastery of concepts and skills covered in this semester.

Duration: 1 hr Scoring: 100 points

#### Final Exam: AP Biology Semester 1 Exam

Take a teacher-scored exam to demonstrate your mastery of concepts and skills covered in this semester.

Duration: 1 hr Scoring: 100 points

## UNIT 6: HOMEOSTASIS

### LESSON 1: INTRODUCTION TO METABOLISM AND HOMEOSTASIS

#### **Read: Introduction to Metabolism and Homeostasis**

Read about how all living systems require constant input of free energy.

Duration: 3 hrs 30 mins Scoring: 0 points

#### **Quiz: Introduction to Metabolism and Homeostasis**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 25 mins Scoring: 30 points

#### **Study: Understanding Endothermy and Ectothermy**

Distinguish between endotherms and ectotherms.

Duration: 1 hr Scoring: 0 points

#### **Quiz: Understanding Endothermy and Ectothermy**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

#### **Study: Detection of Enzyme Activity Levels**

Explain activation energy and how enzymes impact the energy requirements of reactions.

Duration: 1 hr Scoring: 0 points

#### **Quiz: Detection of Enzyme Activity Levels**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

#### **Practice: Introduction to Metabolism and Homeostasis**

Predict properties of substances based on their chemical formulas, and provide explanations of their properties based on particle views.

Duration: 1 hr Scoring: 25 points

#### **Lab: Understanding Enzymes**

Determine which factors can change the rate of an enzyme reaction.

Duration: 2 hrs 45 mins Scoring: 50 points

#### **Discuss: Understanding Enzymes**

Make and discuss some generalizations about enzymes by studying just one enzyme in particular.

Duration: 1 hr Scoring: 15 points

### LESSON 2: ADAPTATIONS, BEHAVIOR, AND LEARNING

#### **Read: Adaptations, Behavior, and Learning**

Read about how natural selection acts on phenotypic variations in populations.

Duration: 3 hrs 30 mins Scoring: 0 points

#### **Quiz: Adaptations, Behavior, and Learning**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 25 mins Scoring: 30 points

#### **Study: Graphing and Understanding Relationships**

Apply mathematical relationships or estimation to determine macroscopic variables for ideal gases.

Duration: 1 hr Scoring: 0 points

#### **Quiz: Graphing and Understanding Relationships**

Use representations and models to analyze situations qualitatively and quantitatively.



Duration: 0 hrs 20 mins Scoring: 20 points

### **Study: Maintaining Homeostasis**

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Duration: 1 hr Scoring: 0 points

### **Quiz: Maintaining Homeostasis**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

### **Practice: Adaptations, Behavior, and Learning**

Evaluate data that show the effect(s) of changes in concentrations of key molecules on negative feedback mechanisms.

Duration: 1 hr Scoring: 25 points

### **Explore: Thermoregulation in Turtle Embryos**

Analyze and evaluate scientific evidence, and then communicate this evidence to your peers and apply it to your own experiences.

Duration: 1 hr 30 mins Scoring: 25 points

## **LESSON 3: HOMEOSTASIS WRAP-UP**

### **Test (CS): Homeostasis Unit Test**

Take a computer-scored test to assess what you have learned in this unit.

Duration: 1 hr Scoring: 50 points

### **Test (TS): Homeostasis Unit Test**

Take a teacher-scored test to assess what you have learned in this unit.

Duration: 1 hr Scoring: 50 points

## **UNIT 7: CELLULAR ENERGETICS**

### **LESSON 1: UNDERSTANDING PHOTOSYNTHESIS**

#### **Read: Understanding Photosynthesis**

Read about how all organisms require constant energy input to maintain organization, to grow, and to reproduce.

Duration: 3 hrs 30 mins Scoring: 0 points

#### **Quiz: Understanding Photosynthesis**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 25 mins Scoring: 30 points

#### **Study: Historical Perspectives on Photosynthesis**

Describe experiments in the history of the understanding of photosynthesis.

Duration: 1 hr Scoring: 0 points

#### **Quiz: Historical Perspectives on Photosynthesis**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

#### **Study: Inhibitors of Photosynthesis**

Explain how chemosynthetic organisms capture free energy.

Duration: 1 hr Scoring: 0 points

#### **Quiz: Inhibitors of Photosynthesis**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

#### **Practice: Understanding Photosynthesis**

Explain how biological systems use free energy, based on empirical data that all organisms require constant energy input to maintain organization, to grow, and to reproduce.

Duration: 1 hr Scoring: 25 points

### **Explore: Photosynthesis Over the Last 100 Years**

Analyze and evaluate scientific evidence, and then communicate this evidence to your peers and apply it to your own experiences.

Duration: 1 hr 30 mins Scoring: 25 points

## **LESSON 2: UNDERSTANDING CELLULAR RESPIRATION**

### **Read: Understanding Cellular Respiration**

Read about the stages of cellular respiration.

Duration: 3 hrs 30 mins Scoring: 0 points

### **Quiz: Understanding Cellular Respiration**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 25 mins Scoring: 30 points

### **Study: Products of Glucose Metabolism**

Determine the net yield of ATP from the oxidation of glucose during the different stages of glycolysis and cellular respiration.

Duration: 1 hr Scoring: 0 points

### **Quiz: Products of Glucose Metabolism**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

### **Study: Carbon Transfer Through Snails and Elodea**

Compare rates of carbon transfer in different organisms.

Duration: 1 hr Scoring: 0 points

### **Quiz: Carbon Transfer Through Snails and Elodea**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

### **Practice: Understanding Cellular Respiration**

Explain changes in reaction rates arising from the use of acid-base catalysts, surface catalysts, or enzyme catalysts, including selecting appropriate mechanisms with or without the catalyst present.

Duration: 1 hr Scoring: 25 points

### **Lab: Cellular Energetics Labs: Photosynthesis (Part A) and Cellular Respiration (Part B)**

Connect and apply concepts, including the relationship between cell structure and function (mitochondria); strategies for capture, storage, and use of free energy; diffusion of gases across cell membranes; and the physical laws pertaining to the properties and behaviors of gases.

Duration: 2 hrs 45 mins Scoring: 50 points

### **Discuss: Cellular Energetics Labs: Photosynthesis (Part A) and Cellular Respiration (Part B)**

Discussion

Duration: 1 hr Scoring: 15 points

## **LESSON 3: CELLULAR ENERGETICS WRAP-UP**

### **Test (CS): Cellular Energetics Unit Test**

Take a computer-scored test to assess what you have learned in this unit.

Duration: 1 hr Scoring: 50 points

### **Test (TS): Cellular Energetics Unit Test**

Take a teacher-scored test to assess what you have learned in this unit.

Duration: 1 hr Scoring: 50 points

## UNIT 8: CELL COMMUNICATION AND BODY SYSTEMS

### LESSON 1: INTEGRATING CELL COMMUNICATION AND THE IMMUNE SYSTEM

#### **Read: Cell Communication**

Read about nonspecific and specific immune defenses in plants and animals.

Duration: 3 hrs 30 mins Scoring: 0 points

#### **Quiz: Cell Communication**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 25 mins Scoring: 30 points

#### **Study: Signal Transduction Pathways**

Identify how a signaling molecule binds to a receptor protein, causing it to change shape.

Duration: 1 hr Scoring: 0 points

#### **Quiz: Signal Transduction Pathways**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

#### **Study: Graphing the Effectiveness of Vaccines**

Create representations or models to describe nonspecific immune defenses in plants and animals.

Duration: 1 hr Scoring: 0 points

#### **Quiz: Graphing the Effectiveness of Vaccines**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

#### **Practice: Integrating Cell Communication and the Immune System**

Create representations and models to describe immune responses.

Duration: 1 hr Scoring: 25 points

#### **Lab: Bacterial Transformation**

Use Le Châtelier's principle to design a set of conditions that will optimize a desired outcome, such as product yield.

Duration: 2 hrs 45 mins Scoring: 50 points

#### **Discuss: Bacterial Transformation**

Discuss the findings of the Bacterial Transformation lab.

Duration: 1 hr Scoring: 15 points

### LESSON 2: CELL SIGNALING IN THE NERVOUS AND ENDOCRINE SYSTEMS

#### **Read: Cell Signaling in the Nervous and Endocrine Systems**

Read about how nervous systems detect external and internal signals.

Duration: 3 hrs 30 mins Scoring: 0 points

#### **Quiz: Cell Signaling in the Nervous and Endocrine Systems**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 25 mins Scoring: 30 points

#### **Study: How Neurons Fire**

Compare interneurons, sensory neurons, and motor neurons.

Duration: 1 hr Scoring: 0 points

#### **Quiz: How Neurons Fire**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

### **Study: Remarkable Sensory Capabilities**

Describe the structure and function of the five types of receptors.

Duration: 1 hr Scoring: 0 points

### **Quiz: Remarkable Sensory Capabilities**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

### **Practice: Cell Signaling in the Nervous and Endocrine Systems**

Predict the solubility of a salt, or rank the solubility of salts, given the relevant  $K_{sp}$  values.

Duration: 1 hr Scoring: 25 points

### **Explore: Encounters with a Deadly Flatworm**

Analyze and evaluate scientific evidence, and then communicate this evidence to your peers and apply it to your own experiences.

Duration: 1 hr 30 mins Scoring: 25 points

## **LESSON 3: CELL COMMUNICATION AND BODY SYSTEMS WRAP-UP**

### **Test (CS): Cell Communication and Body Systems Unit Test**

Take a computer-scored test to assess what you have learned in this unit.

Duration: 1 hr Scoring: 50 points

### **Test (TS): Cell Communication and Body Systems Unit Test**

Take a teacher-scored test to assess what you have learned in this unit.

Duration: 1 hr Scoring: 50 points

## **UNIT 9: ECOLOGICAL PRINCIPLES**

### **LESSON 1: ORGANISMS AND POPULATIONS IN THEIR ENVIRONMENT**

#### **Read: Organisms and Populations in Their Environment**

Read about how changes in the availability of free energy can result in changes in population size.

Duration: 3 hrs 30 mins Scoring: 0 points

#### **Quiz: Organisms and Populations in Their Environment**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 25 mins Scoring: 30 points

#### **Study: Food Chains and Webs**

Explain the flow of energy through ecosystems.

Duration: 1 hr Scoring: 0 points

#### **Quiz: Food Chains and Webs**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

#### **Study: Carrying Capacity**

Define carrying capacity and explain how it affects the increase in size of a population.

Duration: 1 hr Scoring: 0 points

#### **Quiz: Carrying Capacity**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

**Practice: Organisms and Populations in Their Environment**

Predict how changes in the availability of free energy affects organisms, populations, and ecosystems.

Duration: 1 hr Scoring: 25 points

**Lab: Energy Dynamics**

Conduct an experiment to investigate a question about energy capture and flow in an ecosystem.

Duration: 2 hrs 45 mins Scoring: 50 points

**Discuss: Energy Dynamics**

Discuss the findings of the Energy Dynamics lab.

Duration: 1 hr Scoring: 15 points

**LESSON 2: ECOLOGICAL COMMUNITIES****Read: Ecological Communities**

Read about how the availability of energy affects organisms, populations, and ecosystems.

Duration: 3 hrs 30 mins Scoring: 0 points

**Quiz: Ecological Communities**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 25 mins Scoring: 30 points

**Study: Mathematical Effects of Population Interactions**

Illustrate and investigate population interactions within and environmental impacts on a community.

Duration: 1 hr Scoring: 0 points

**Quiz: Mathematical Effects of Population Interactions**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

**Study: Invasive Species**

Explain how invasive species circumvent the natural predator-prey cycle in an ecosystem.

Duration: 1 hr Scoring: 0 points

**Quiz: Invasive Species**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

**Practice: Ecological Communities**

Predict how changes in the availability of free energy affects organisms, populations, and ecosystems.

Duration: 1 hr Scoring: 25 points

**Explore: Tree Rings, Carbon Dioxide, and Climatic Change**

Analyze, evaluate, and critique scientific explanations by examining scientific evidence.

Duration: 1 hr 30 mins Scoring: 25 points

**LESSON 3: ECOLOGICAL PRINCIPLES WRAP-UP****Test (CS): Ecological Principles Unit Test**

Take a computer-scored test to assess what you have learned in this unit.

Duration: 1 hr Scoring: 50 points

**Test (TS): Ecological Principles Unit Test**

Take a teacher-scored test to assess what you have learned in this unit.

Duration: 1 hr Scoring: 50 points

**UNIT 10: AP BIOLOGY SEMESTER 2 EXAM**

## LESSON 1: AP BIOLOGY SEMESTER 2 EXAM

### **Exam: AP Biology Semester 2 Exam**

Take a computer-scored exam to demonstrate your mastery of concepts and skills covered in this semester.

Duration: 1 hr Scoring: 100 points

### **Final Exam: AP Biology Semester 2 Exam**

Take a teacher-scored exam to demonstrate your mastery of concepts and skills covered in this semester.

Duration: 1 hr Scoring: 100 points