

Biology focuses on the mastery of basic biological concepts and models while building scientific inquiry skills and exploring the connections between living things and their environment.

The course begins with an introduction to the nature of science and biology, including the major themes of structure and function, matter and energy flow, systems, and the interconnectedness of life. Students then apply those themes to the structure and function of the cell, cellular metabolism, and biogeochemical cycles. Building on this foundation, students explore the connections and interactions between living things by studying genetics, ecosystems and natural selection, and evolution. The course ends with an applied look at human biology.

Scientific inquiry skills are embedded in the direct instruction, wherein students learn to ask scientific questions, form and test hypotheses, and use logic and evidence to draw conclusions about the concepts.

Lab activities reinforce critical thinking, writing, and communication skills and help students develop a deeper understanding of the nature of science.

This course is built to state standards and informed by the Next Generation Science Standards (NGSS).

Length: Two semesters

## UNIT 1: INTRODUCTION TO BIOLOGY

### LESSON 1: BIOLOGICAL SCIENCE

#### **Study: What Is Science?**

Learn about the nature of science.

Duration: 1 hr Scoring: 0 points

#### **Quiz: What Is Science?**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

#### **Study: Biology, Technology, and Society**

Learn how science, technology, and society affect one another.

Duration: 1 hr Scoring: 0 points

#### **Quiz: Biology, Technology, and Society**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

#### **Study: Biology Basics**

Learn about the main characteristics of life.

Duration: 1 hr Scoring: 0 points

#### **Quiz: Biology Basics**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

### LESSON 2: TOOLS OF INQUIRY

#### **Study: Scientific Investigations**

Learn how to design a scientific investigation.

Duration: 1 hr Scoring: 0 points

#### **Quiz: Scientific Investigations**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

### **Study: Modeling**

Learn about different types of scientific models.

Duration: 1 hr Scoring: 0 points

### **Quiz: Modeling**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

### **Study: Data Analysis**

Learn how to use common data analysis techniques.

Duration: 1 hr Scoring: 0 points

### **Quiz: Data Analysis**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

### **Practice: Data Analysis**

Answer open-response questions to assess your understanding of the material.

Duration: 0 hrs 40 mins Scoring: 25 points

## **LESSON 3: INTRODUCTION TO BIOLOGY WRAP-UP**

### **Review: Introduction to Biology**

Review what you have learned in this unit.

Duration: 0 hrs 30 mins Scoring: 0 points

### **Test (CS): Introduction to Biology**

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

Duration: 0 hrs 30 mins Scoring: 50 points

### **Test (TS): Introduction to Biology**

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

Duration: 0 hrs 30 mins Scoring: 50 points

## **UNIT 2: ENERGY AND MATTER IN LIVING SYSTEMS**

### **LESSON 1: THE BUILDING BLOCKS OF LIFE**

#### **Study: From Atoms to Biosphere**

Learn about the hierarchical organization of biological systems.

Duration: 1 hr Scoring: 0 points

#### **Quiz: From Atoms to Biosphere**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

#### **Study: Biomolecules**

Learn about the four main types of biomolecules.

Duration: 1 hr Scoring: 0 points

#### **Quiz: Biomolecules**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

#### **Study: Energy and Matter in the Biosphere**

Learn how energy flows and matter cycles through living systems.

Duration: 1 hr Scoring: 0 points

#### **Quiz: Energy and Matter in the Biosphere**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

### **Lab: Modeling the Carbon Cycle**

Use a simulation to model the carbon cycle.

Duration: 3 hrs Scoring: 50 points

## **LESSON 2: PHOTOSYNTHESIS AND CELLULAR RESPIRATION**

### **Study: Photosynthesis**

Learn how autotrophs use photosynthesis to make food.

Duration: 1 hr Scoring: 0 points

### **Quiz: Photosynthesis**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

### **Study: Cellular Respiration**

Learn how cells use cellular respiration to meet their energy needs.

Duration: 1 hr Scoring: 0 points

### **Quiz: Cellular Respiration**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

### **Lab: Modeling Photosynthesis and Cellular Respiration**

Use models to investigate photosynthesis and cellular respiration.

Duration: 3 hrs Scoring: 50 points

## **LESSON 3: INVESTIGATING ENERGY AND MATTER IN LIVING SYSTEMS**

### **Lab: Investigating the Flow of Energy and Cycling of Matter**

Investigate how energy flows and matter cycles through living systems.

Duration: 3 hrs Scoring: 50 points

### **Discuss: Investigating the Flow of Energy and Cycling of Matter**

Discuss your lab results.

Duration: 0 hrs 20 mins Scoring: 15 points

## **LESSON 4: ENERGY AND MATTER IN LIVING SYSTEMS WRAP-UP**

### **Review: Energy and Matter in Living Systems**

Review what you have learned in this unit.

Duration: 0 hrs 30 mins Scoring: 0 points

### **Test (CS): Energy and Matter in Living Systems**

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

Duration: 0 hrs 30 mins Scoring: 50 points

### **Test (TS): Energy and Matter in Living Systems**

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

Duration: 0 hrs 30 mins Scoring: 50 points

## **UNIT 3: ECOSYSTEMS**

### **LESSON 1: RELATIONSHIPS IN ECOSYSTEMS**

#### **Study: Food Chains and Energy Pyramids**

Learn how energy and matter enter, move through, and exit ecosystems.

Duration: 1 hr Scoring: 0 points

#### **Quiz: Food Chains and Energy Pyramids**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

### **Study: Changes in Populations**

Learn how changes in biotic and abiotic factors can increase or decrease the size of a population.

Duration: 1 hr Scoring: 0 points

### **Quiz: Changes in Populations**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

### **Practice: Relationships in Ecosystems**

Answer open-response questions to assess your understanding of the material.

Duration: 0 hrs 40 mins Scoring: 25 points

## **LESSON 2: ECOSYSTEM STABILITY AND CHANGE**

### **Study: Ecological Succession**

Learn how ecosystems recover from disturbances and change over time.

Duration: 1 hr Scoring: 0 points

### **Quiz: Ecological Succession**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

### **Explore: Changes in Ecosystems**

Research how changing environmental conditions can result in a new ecosystem.

Duration: 1 hr 30 mins Scoring: 35 points

### **Study: Impact of Humans on Ecosystems**

Learn how human activities can impact ecosystems.

Duration: 1 hr Scoring: 0 points

### **Quiz: Impact of Humans on Ecosystems**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

### **Lab: Engineering a Solution to Reduce Human Impact**

Identify one way human activities have impacted an ecosystem, and design a solution to mitigate the impact.

Duration: 3 hrs Scoring: 50 points

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

### **Review: Ecosystems**

Review what you have learned in this unit.

Duration: 0 hrs 30 mins Scoring: 0 points

### **Test (CS): Ecosystems**

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

Duration: 0 hrs 30 mins Scoring: 50 points

### **Test (TS): Ecosystems**

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

Duration: 0 hrs 30 mins Scoring: 50 points

## **UNIT 4: MULTICELLULAR ORGANISMS**

### **LESSON 1: GROWTH AND DEVELOPMENT**

#### **Study: Mitotic Cell Division**

Learn how eukaryotic cells reproduce.

Duration: 1 hr Scoring: 0 points

#### **Quiz: Mitotic Cell Division**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

### **Study: Cell Differentiation**

Learn how eukaryotic cells differentiate in order to become specialized.

Duration: 1 hr Scoring: 0 points

### **Quiz: Cell Differentiation**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

### **Lab: Modeling Cell Division and Differentiation**

Use models to investigate cell division and differentiation.

Duration: 3 hrs Scoring: 50 points

## **LESSON 2: TISSUES, ORGANS, AND BODY SYSTEMS**

### **Study: Tissues and Organs**

Learn how cells in most multicellular organisms are organized into tissues and organs.

Duration: 1 hr Scoring: 0 points

### **Quiz: Tissues and Organs**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

### **Study: Animal Systems**

Learn about common animal organ systems and how they interact with one another.

Duration: 1 hr Scoring: 0 points

### **Quiz: Animal Systems**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

### **Study: Plant Systems**

Learn about common plant organ systems and how they interact with one another.

Duration: 1 hr Scoring: 0 points

### **Quiz: Plant Systems**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

### **Lab: Modeling Organ System Interactions**

Use models to investigate organ system interactions.

Duration: 3 hrs Scoring: 50 points

## **LESSON 3: HOMEOSTASIS**

### **Study: Homeostasis**

Learn how multicellular organisms maintain homeostasis.

Duration: 1 hr Scoring: 0 points

### **Quiz: Homeostasis**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

### **Lab: Investigating Homeostasis**

Plan and conduct an investigation to discover how an organism maintains homeostasis.

Duration: 3 hrs Scoring: 50 points

### **Discuss: Investigating Homeostasis**

Discuss your lab results.

Duration: 0 hrs 20 mins Scoring: 15 points

## LESSON 4: MULTICELLULAR ORGANISMS WRAP-UP

### Review: Multicellular Organisms

Review what you have learned in this unit.

Duration: 0 hrs 30 mins Scoring: 0 points

### Test (CS): Multicellular Organisms

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

Duration: 0 hrs 30 mins Scoring: 50 points

### Test (TS): Multicellular Organisms

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

Duration: 0 hrs 30 mins Scoring: 50 points

## UNIT 5: SEMESTER 1 REVIEW AND EXAM

### LESSON 1: SEMESTER 1 REVIEW AND EXAM

#### Review: Semester 1 Review

Review what you have learned in this semester.

Duration: 0 hrs 30 mins Scoring: 0 points

#### Exam: Semester 1 Computer-Scored Exam

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

Duration: 0 hrs 40 mins Scoring: 100 points

#### Final Exam: Semester 1 Teacher-Scored Exam

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

Duration: 0 hrs 40 mins Scoring: 100 points

## UNIT 6: HEREDITY

### LESSON 1: GENETIC INHERITANCE

#### Study: Introduction to Heredity

Learn about discoveries that led to an understanding of how traits are inherited.

Duration: 1 hr Scoring: 0 points

#### Quiz: Introduction to Heredity

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

#### Study: Chromosomes and DNA

Learn about the structures of DNA and chromosomes.

Duration: 1 hr Scoring: 0 points

#### Quiz: Chromosomes and DNA

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

### LESSON 2: DNA REPLICATION AND MEIOSIS

#### Study: DNA Replication

Learn about the process of DNA replication.

Duration: 1 hr Scoring: 0 points

#### Quiz: DNA Replication

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

#### Study: Meiotic Cell Division

Learn how gametes are produced by the process of meiosis.

Duration: 1 hr Scoring: 0 points

### **Quiz: Meiotic Cell Division**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

### **Practice: DNA Replication and Meiosis**

Answer open-response questions to assess your understanding of the material.

Duration: 0 hrs 40 mins Scoring: 25 points

## **LESSON 3: PATTERNS OF INHERITANCE**

### **Study: Types of Inheritance**

Learn about patterns of inheritance.

Duration: 1 hr Scoring: 0 points

### **Quiz: Types of Inheritance**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

### **Study: Predicting Genetic Outcomes**

Learn how to use Punnett squares and pedigree charts to make predictions.

Duration: 1 hr Scoring: 0 points

### **Quiz: Predicting Genetic Outcomes**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

### **Explore: Explaining Heredity**

Research the roles of DNA and chromosomes in a disease that can be passed from parents to offspring.

Duration: 1 hr 30 mins Scoring: 35 points

## **LESSON 4: HEREDITY WRAP-UP**

### **Review: Heredity**

Review what you have learned in this unit.

Duration: 0 hrs 30 mins Scoring: 0 points

### **Test (CS): Heredity**

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

Duration: 0 hrs 30 mins Scoring: 50 points

### **Test (TS): Heredity**

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

Duration: 0 hrs 30 mins Scoring: 50 points

## **UNIT 7: GENES AND TRAITS**

### **LESSON 1: GENE EXPRESSION**

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

Learn how proteins are made using the codes in genes.

Duration: 1 hr Scoring: 0 points

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

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

#### **Lab: Modeling Protein Synthesis**

Use models to investigate the process of protein synthesis.

Duration: 3 hrs Scoring: 50 points

#### **Study: Regulation of Gene Expression**

Learn how gene expression is regulated.

Duration: 1 hr Scoring: 0 points

### **Quiz: Regulation of Gene Expression**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

## **LESSON 2: GENETIC VARIATION**

### **Study: Origins of Genetic Variation**

Learn about the sources of genetic variation.

Duration: 1 hr Scoring: 0 points

### **Quiz: Origins of Genetic Variation**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

### **Study: Population Genetics**

Learn about allele frequencies in a population and how they can change.

Duration: 1 hr Scoring: 0 points

### **Quiz: Population Genetics**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

### **Practice: Genetic Variation**

Answer open-response questions to assess your understanding of the material.

Duration: 0 hrs 40 mins Scoring: 25 points

## **LESSON 3: GENES AND TRAITS WRAP-UP**

### **Review: Genes and Traits**

Review what you have learned in this unit.

Duration: 0 hrs 30 mins Scoring: 0 points

### **Test (CS): Genes and Traits**

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

Duration: 0 hrs 30 mins Scoring: 50 points

### **Test (TS): Genes and Traits**

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

Duration: 0 hrs 30 mins Scoring: 50 points

## **UNIT 8: NATURAL SELECTION**

### **LESSON 1: ADAPTATIONS**

#### **Study: Adaptations in Populations**

Learn how adaptations help organisms survive and reproduce.

Duration: 1 hr Scoring: 0 points

#### **Quiz: Adaptations in Populations**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

#### **Explore: Group Behavior and Survival**

Research how group behavior affects the survival of a species.

Duration: 1 hr 30 mins Scoring: 35 points

#### **Study: Natural Selection and Population Change**

Learn how natural selection can cause the traits of populations to change.

Duration: 1 hr Scoring: 0 points



### **Quiz: Natural Selection and Population Change**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

## **LESSON 2: NATURAL SELECTION IN ACTION**

### **Lab: Investigating Natural Selection**

Use a simulation to investigate natural selection.

Duration: 3 hrs Scoring: 50 points

### **Discuss: Investigating Natural Selection**

Discuss your lab results.

Duration: 0 hrs 20 mins Scoring: 15 points

### **Lab: Analyzing Natural Selection**

Analyze data gathered from a simulation to draw conclusions about natural selection.

Duration: 3 hrs Scoring: 50 points

## **LESSON 3: OTHER MECHANISMS OF POPULATION CHANGE**

### **Lab: Modeling Genetic Drift and Gene Flow**

Use models to investigate genetic drift and gene flow.

Duration: 3 hrs Scoring: 50 points

### **Discuss: Modeling Genetic Drift and Gene Flow**

Discuss your lab results.

Duration: 0 hrs 20 mins Scoring: 15 points

## **LESSON 4: NATURAL SELECTION WRAP-UP**

### **Review: Natural Selection**

Review what you have learned in this unit.

Duration: 0 hrs 30 mins Scoring: 0 points

### **Test (CS): Natural Selection**

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

Duration: 0 hrs 30 mins Scoring: 50 points

### **Test (TS): Natural Selection**

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

Duration: 0 hrs 30 mins Scoring: 50 points

## **UNIT 9: EVOLUTION**

### **LESSON 1: CHANGES TO EARTH'S SPECIES**

#### **Study: Darwin's Theory of Evolution**

Learn how evidence was used to develop the scientific theory of evolution.

Duration: 1 hr Scoring: 0 points

#### **Quiz: Darwin's Theory of Evolution**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

#### **Study: Modern Research on Evolution**

Learn about modern evidence that supports the theory of evolution.

Duration: 1 hr Scoring: 0 points

#### **Quiz: Modern Research on Evolution**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

#### **Study: Speciation and Extinction**

Learn how new species form and why species go extinct.

Duration: 1 hr Scoring: 0 points

### **Quiz: Speciation and Extinction**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

### **Practice: Evolution**

Answer open-response questions to assess your understanding of the material.

Duration: 0 hrs 40 mins Scoring: 25 points

## **LESSON 2: THE TREE OF LIFE**

### **Study: History of Life on Earth**

Learn how life has changed throughout Earth's history.

Duration: 1 hr Scoring: 0 points

### **Quiz: History of Life on Earth**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

### **Study: Phylogenetic Systematics**

Learn how evolutionary relationships are used to classify organisms.

Duration: 1 hr Scoring: 0 points

### **Quiz: Phylogenetic Systematics**

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

## **LESSON 3: PREVENTING EXTINCTIONS**

### **Explore: Environmental Change and Evolution**

Research how changes in the environment can cause a species to change.

Duration: 1 hr 30 mins Scoring: 35 points

### **Lab: Engineering a Solution to Protect Species**

Use a simulation to design solutions to protect species.

Duration: 3 hrs Scoring: 50 points

### **Discuss: Engineering a Solution to Protect Species**

Discuss your lab results.

Duration: 0 hrs 20 mins Scoring: 15 points

## **LESSON 4: EVOLUTION WRAP-UP**

### **Review: Evolution**

Review what you have learned in this unit.

Duration: 0 hrs 30 mins Scoring: 0 points

### **Test (CS): Evolution**

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

Duration: 0 hrs 30 mins Scoring: 50 points

### **Test (TS): Evolution**

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

Duration: 0 hrs 30 mins Scoring: 50 points

## **UNIT 10: SEMESTER 2 REVIEW AND EXAM**

### **LESSON 1: SEMESTER 2 REVIEW AND EXAM**

#### **Review: Semester 2 Review**

Review what you have learned in this semester.

Duration: 0 hrs 30 mins Scoring: 0 points

**Exam: Semester 2 Computer-Scored Exam**

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

Duration: 0 hrs 40 mins Scoring: 100 points

**Final Exam: Semester 2 Teacher-Scored Exam**

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

Duration: 0 hrs 40 mins Scoring: 100 points