

# Syllabus

## Science 8, Semester A

### Course Overview

Science is the study of the natural world. It relies on investigations and evidence to describe the natural events that occur around us. Science 8A is an integrated science course that covers topics selected from Earth science and life science. This course discusses genes and inheritance, the evolution of species, and managing energy resources on Earth. In the first unit, you will explain how an organism's genes transfer traits from parents to offspring. You'll also learn about genetic diversity and genetic mutations. In the second unit, you'll compare the anatomy and development of species to give evidence for evolution. You'll also see how fossils and rock strata on Earth hold important clues about evolution. In the third unit, you will differentiate between renewable and nonrenewable energy resources on Earth. You'll see how energy transforms as it moves from one sphere of Earth to another. In hands-on activities, you'll devise ways to harness and control energy for human benefit.

### Course Goals

By the end of this course, you will be able to do the following:

- Investigate patterns of inheritance, and identify the causes and effects of genetic mutations.
- Explain how some traits increase an individual's probability of surviving.
- Gather and use information to explain how technology has changed the way humans influence the traits of organisms.
- Explain why genetic diversity allows a species to adapt to its environment, and create an explanation to show the causes and effects of shifting genetic diversity.
- Model the geological process that makes fossils from leaves.
- Explain how the characteristics of living and extinct organisms can be used to construct an evolutionary lineage.
- Classify organisms based on their shared characteristics.
- State why embryos and certain anatomies of different species provide evidence of evolution.
- Classify organisms based on their shared characteristics.
- Describe the interactions of energy between the four spheres of Earth.
- Explain particle motion of matter and the composition of substances.
- Use evidence to explain that natural geological processes result in uneven distribution of Earth's natural resources.

- Design a device that harnesses energy from the Sun.
- Use historical evidence of natural hazards to determine the disaster risk for a region.
- Engineer a structure to protect the public from a natural hazard.

## **General Skills**

To participate in this course, you should be able to do the following:

- Complete basic operations with word processing software, such as Microsoft Word or Google Docs.
- Complete basic operations with presentation software, such as Microsoft PowerPoint or Google Docs presentation.
- Perform online research using various search engines and library databases.
- Communicate through email and participate in discussion boards.

*For a complete list of general skills that are required for participation in online courses, refer to the Prerequisites section of the Plato Student Orientation document, found at the beginning of this course.*

## **Credit Value**

Science 8A is a 0.5-credit course.

## **Course Materials**

- notebook
- computer with Internet connection and speakers or headphones
- Microsoft Word or equivalent
- Microsoft PowerPoint or equivalent
- equipment listed in Appendix B

## **Course Pacing Guide**

This course description and pacing guide is intended to help you stay on schedule with your work. Note that your course instructor may modify the schedule to meet the specific needs of your class.

## **Unit 1: Genes**

### **Summary**

This unit discusses the important aspects of genetics. You'll begin by reviewing the process of scientific inquiry. Then you'll explore how genetic characteristics are related to genes, chromosomes, genotype, and phenotype. You will evaluate your own genetic characteristics and determine the probability of inheriting certain traits. You'll learn

about dominant and recessive traits and the difference between homozygous and heterozygous genes. Next, you'll explore the types, causes, and effects of genetic mutations. In a hands-on activity, you'll research the adaptations of two different organisms and compare them. Finally, you'll determine the effects of natural and artificial selection and see how genetic diversity plays a significant role in helping a species adapt to its ever-changing environment.

Day	Activity/Objective	Type
1 day: 1	<b>Syllabus and Plato Student Orientation</b> <i>Review the Plato Student Orientation and Course Syllabus at the beginning of this course.</i>	Course Orientation
3 days: 2–4	<b>What Is Science?</b> <i>Apply the steps of the scientific method to an investigation.</i>	Lesson
3 days: 5–7	<b>Introduction to Genes</b> <i>Investigate different patterns of inheritance, and predict the genetic inheritance of offspring.</i>	Lesson
4 days: 8–11	<b>Your Genetic Traits</b> <i>Create Punnett squares and genetic flowchart models to calculate the probability that an offspring will inherit a specific trait.</i>	Course Activity
3 days: 12–14	<b>Genetic Mutations</b> <i>Identify the causes and effects of genetic mutations.</i>	Lesson
3 days: 15–17	<b>Identifying Adaptations</b> <i>Compare and contrast the adaptations of two different organisms that live in different environments.</i>	Course Activity
3 days: 18–20	<b>Natural Selection</b> <i>Construct an explanation that describes how some traits increase an individual's probability of surviving and reproducing in its environment.</i>	Lesson
4 days: 21–24	<b>Artificial Selection</b> <i>Gather and use information to explain how technology has changed the way that humans influence the traits of organisms.</i>	Lesson

<b>Day</b>	<b>Activity/Objective</b>	<b>Type</b>
3 days: 25–27	<b>Genetic Diversity</b> <i>Explain why genetic diversity allows a species to adapt to its environment.</i>	Lesson
5 days: 28–32	<b>Unit Activity and Discussion—Unit 1</b>	Unit Activity/ Discussion
1 day: 33	<b>Posttest—Unit 1</b>	Assessment

## Unit 2: Evolution

### Summary

This unit focuses on the evolution of different organisms. At the beginning of the unit, you will use real leaves and sticks to model fossil formation to learn more about how they are formed. Then you'll be introduced to evolution and how to classify organisms based on their characteristics. You'll compare the embryonic development and anatomy of different species and explain how anatomical similarities give evidence of evolution. Finally, you'll apply your knowledge of fossils to understand how rock strata in Earth's crust hold clues about how life-forms have changed and evolved over time.

<b>Day</b>	<b>Activity/Objective</b>	<b>Type</b>
4 days: 34–37	<b>Fossils and Coal Formation</b> <i>Model the geological process that makes fossils from leaves.</i>	Course Activity
3 days: 38–40	<b>What Is Evolution?</b> <i>Explain how the characteristics of living and extinct organisms can be used to construct an evolutionary lineage.</i>	Lesson
4 days: 41–44	<b>Classifying Organisms</b> <i>Classify organisms based on their shared characteristics.</i>	Course Activity
3 days: 45–47	<b>Embryology</b> <i>Explain why similarities in embryos of different species provide evidence of evolution.</i>	Lesson

Day	Activity/Objective	Type
3 days: 48–50	<b>Comparative Anatomy</b> <i>Examine anatomical similarities between organisms, and explain why these similarities provide evidence of evolution.</i>	Lesson
4 days 51–54	<b>Fossils</b> <i>Analyze data from rock strata for evidence that life-forms have changed and evolved.</i>	Lesson
5 days: 55–59	<b>Unit Activity and Discussion—Unit 2</b>	Unit Activity/ Discussion
1 day: 60	<b>Posttest—Unit 2</b>	Assessment

## Unit 3: Energy and the Earth

### Summary

The focus of this unit is understanding and managing energy on Earth. You'll begin by modeling the energy flow among Earth's four spheres. You will apply these ideas in a hands-on activity as you build a model of a watershed. Next, you'll explore matter at the atomic level and analyze how substances, such as water, go through three states of matter: solid, liquid, and gas. You'll create a model of Earth's oceans and engineer a structure to control the energy of a tsunami. You'll also investigate other methods that scientists use to protect and warn the public about natural hazards. Finally, you'll examine the processes that change the distribution of Earth's natural resources and build a device that depends on one of our most common natural resources—the Sun.

Day	Activity/Objective	Type
4 days: 61–64	<b>Energy Flow</b> <i>Use a model to explain the flow of energy within a system, and describe the interactions of energy between the four spheres of Earth.</i>	Lesson
2 days: 65–66	<b>Modeling a Watershed</b> <i>Construct and use a model to explain how water flow in a watershed relates to the water cycle on Earth.</i>	Course Activity

<b>Day</b>	<b>Activity/Objective</b>	<b>Type</b>
3 days: 67–69	<b>Matter and Energy</b> <i>Use models to explain particle motion of matter and the composition of mixtures, compounds, and elements.</i>	Lesson
3 days: 70–72	<b>Modeling Tsunamis</b> <i>Construct a model of an ocean, and design features for houses along the shore to withstand the force of a tsunami.</i>	Course Activity
3 days: 73–75	<b>Natural Hazards</b> <i>Use historical evidence of natural hazards to determine the disaster risk for a region.</i>	Lesson
4 days 76–79	<b>Designing a Solar Oven</b> <i>Design and construct two solar ovens, test them, and use the test results to determine which design is more effective.</i>	Course Activity
3 days 80–82	<b>Natural Resources</b> <i>Use evidence to explain that natural geological processes result in uneven distributions of natural resources across the globe.</i>	Lesson
5 days: 83–87	<b>Unit Activity and Discussion—Unit 3</b>	Unit Activity/ Discussion
1 day: 88	<b>Posttest—Unit 3</b>	Assessment
1 day 89	<b>Semester Review</b>	
1 day 90	<b>End-of-Semester Test</b>	Assessment

## Appendix A: Safety Notes and Disclaimer

Each Course Activity and Unit Activity that includes a lab/experiment component will highlight key safety guidelines using the safety icon () , which appears directly in the activity. In addition to adhering to those guidelines, you must ensure that you follow these general safety practices:

- Work slowly and safely at all times, and abide by the safety notes and icons.
- Pay attention and be alert at all times. Limit any distractions.
- Keep your hands away from your nose, eyes, mouth, and skin. Wash your hands before and after experiments.
- If you don't understand something, ask a teacher or an adult before proceeding.
- Wear the required protective gear.
- Adult supervision is required for all activities involving an experiment/lab component.
- Do not perform experiments that have not been approved. Follow the procedure.
- Follow good housekeeping practices. Keep your work area clean.
- Abide by all disposal instructions and icons to protect yourself and our planet.
- Report any problems or complications to an adult.

**Note:** *Edmentum assumes no liability for personal injury, death, property damage, equipment damage, or financial loss resulting from the instruction included in this course.*

## Appendix B: Equipment List for Course Activities and Unit Activities

Unit	Activity Name	Task	Equipment List
1	Course Activity: Your Genetic Traits	Task 1: Analyzing Genetic Traits	None
		Task 2: Creating a Genetic Pedigree Chart	None
1	Course Activity: Identifying Adaptations	Writing a Research Paper	None
1	Unit Activity: Genes	Writing a Research Paper	None
2	Course Activity: Fossils and Coal Formation	Modeling Fossil Formation	<ul style="list-style-type: none"> <li>• a plastic container about the size and shape of a shoebox</li> <li>• plastic wrap</li> <li>• water</li> <li>• a ruler</li> <li>• about 3 cups of sand</li> <li>• plastic gloves (kitchen gloves or cleaning gloves)</li> <li>• 10 to 12 leaves (any kind)</li> <li>• 10 to 12 twigs and sticks</li> </ul>
2	Course Activity: Classifying Organisms	Task 1: Creating a Dichotomous Key	None
		Task 2: Classifying Organisms	None
2	Unit Activity: Evolution	Researching Evolutionary History	None

Unit	Activity Name	Task	Equipment List
3	Course Activity: Modeling a Watershed	Task 1: Modeling Water Flow in a Watershed	<ul style="list-style-type: none"> <li>• permanent marker (black or dark blue)</li> <li>• aluminum foil</li> <li>• scissors</li> <li>• water in a spray bottle</li> <li>• 8–10 cups peat moss or topsoil</li> <li>• clear container or small aquarium approximately 10 × 12 inches and 4 inches deep</li> <li>• 15 cups pea gravel, aquarium gravel, or small stones</li> </ul>
		Task 2: Modeling Groundwater Contamination	<ul style="list-style-type: none"> <li>• cylinder container about 4 to 5 inches in diameter</li> <li>• pitcher of water</li> <li>• 3–5 cups pea gravel, aquarium gravel, or small stones</li> <li>• 3–5 cups peat moss or topsoil</li> <li>• screen material (the width should nearly match the height of the container)</li> <li>• 2 large drinking cups</li> <li>• food coloring</li> <li>• tape</li> </ul>
3	Course Activity: Modeling Tsunamis	Task 1: Modeling Tsunamis	<ul style="list-style-type: none"> <li>• 1 piece of 8 × 11-inch card stock</li> <li>• 1 sheet of 8 × 11-inch printer paper</li> <li>• 1 piece of 8 × 11-inch cardboard</li> <li>• a long, shallow plastic container, around 30 inches long, 15 inches wide, and 5 inches deep</li> <li>• tape or glue</li> <li>• a small plate or tray</li> <li>• water</li> <li>• a ruler</li> <li>• a small bag of sand, about 2 pounds</li> </ul>

Unit	Activity Name	Task	Equipment List
		Task 2: Protecting Your Model Village from Tsunamis	<ul style="list-style-type: none"> <li>• 2 pieces of 8 × 11-inch printer paper</li> <li>• 2 pieces of 8 × 11-inch card stock</li> <li>• 1 piece of 8 × 11-inch cardboard</li> <li>• a long, shallow plastic container, around 30 inches long, 15 inches wide, and 5 inches deep</li> <li>• tape or glue</li> <li>• a small plate or tray</li> <li>• water</li> <li>• a ruler</li> <li>• a small bag of sand, about 2 pounds</li> </ul>
3	Course Activity: Designing a Solar Oven	Task 1: Designing a Solar Oven	<ul style="list-style-type: none"> <li>• 2 thermometers that reach at least 120°F (50°C)</li> <li>• 2 boxes of any size that the thermometer will fit inside</li> </ul> <p>Optional design materials:</p> <ul style="list-style-type: none"> <li>• plastic wrap</li> <li>• aluminum foil</li> <li>• paper</li> <li>• scissors or a box cutter</li> <li>• ruler</li> <li>• masking tape or clear packaging tape</li> <li>• glue</li> </ul>
3	Unit Activity: Energy and the Earth	Task 1: Planning and Creating a Presentation	None