Biology, Semester B

Course Overview

Biology, Semester B, is a single-semester course designed to strengthen your knowledge of biology concepts. The first unit focuses on the classification, characteristics and biological processes of living organisms. In the second unit, you'll study evolutionary mechanisms and the impact of environmental factors on species over time. The third unit focuses on the conservation of energy as it relates to living things and different ecosystems. In the last unit, you'll explore how different ecosystems are interdependent.

Course Goals

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

- Classify insects based on their physical and developmental characteristics.
- Explain the major characteristics of archeabacteria, bacteria, and protists.
- Compare the characteristics and biological processes of plants and fungi and of invertebrates and vertebrates.
- Evaluate the effects of evolutionary mechanisms on the characteristics of current and extinct species.
- Explain the effect of environmental changes on the selection of desired traits in a population.
- Explain how genetic variation, natural selection, and environment lead to adaptations in organisms.
- Explain conservation of energy as it relates to living things and different ecosystems.
- Develop a model to show how photosynthesis and cellular respiration transform and use energy.
- Explain the need for macronutrients and micronutrients in the human body to

support homeostasis and the use of energy.

• Explain how the cycling of matter and energy interacts with biological processes.

• Analyze the effects of environmental changes on relationships in an ecosystem.

• Use mathematics to explain the factors that affect carrying capacity of ecosystems at different scales.

• Explain how a change affects biodiversity of an ecosystem.

• Use evidence and scientific reasoning to choose the best solution to a biodiversity problem.

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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.

• Understand the basics of spreadsheet software, such as Microsoft Excel or Google spreadsheets, but prior computing experience is not necessary.

• 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 Student Orientation document, found at the beginning of this course.

Credit Value

Biology B is a 0.5-credit course.

Course Materials

• notebook

- computer with Internet connection and speakers or headphones
- Microsoft Word or equivalent
- Microsoft Excel or equivalent
- Microsoft PowerPoint or equivalent
- materials listed in Appendix B (Appendix C provides a detailed breakdown of these materials per activity.)

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: Organization of Organisms

Summary This unit begins with an activity that involves classifying insects based on their characteristics. Next, you'll study the major characteristics of archeabacteria, bacteria, and protists. Finally, you'll compare the characteristics and biological processes of plants and fungi and then compare the characteristics and biological processes of invertebrates and vertebrates.

Day	Activity/*Objective*	Type
1 day: 1	**Orientation** *Review the Student Syllabus at the beginning of this Course Orientation*	Course Activity
3 days: 2–4	**Classifying Organisms** *Classify insects based on their physical and developmental characteristics.*	Lesson
3 days: 5–7	**Bacteria and Protists** *Explain the major characteristics of archeabacteria, bacteria, and protists.*	Lesson

3 days: 8–10		Lesson Lesson
pare and contrast the *gical processes of plants and*		
	Lesson Lesson	5 days: 14–18
	Unit Activity and Discussion—Unit 1 Unit Activity/	Discussion
3 days: 11–13		1 day: 19
contrast the characteristics and *nvertebrates and vertebrates.*	**Posttest—Unit 1** Assessment	

Unit 2: Evolution

Summary In this unit, you'll examine evolutionary mechanisms and design a simulation that shows the change in the environment on the selection of desired traits in a population. You'll then explain how ge variation, natural selection, and environment lead to adaptations in organisms. You'll use the genetic c particular animal species to construct a written argument for the long-term viability of a specific breed. explain how environmental changes can lead to the development of new species or an increase or dec population of a species.

Day	Activity/*Objective*	Type
3 days: 20–22		
ion *Evaluate the effects of* *ns on the characteristics of* *ies.*		3 days: 23–25
	Adaptations in a Changing Environment *Design a simulation that shows how a change in the environment influences the selection of desired traits in a population.*	Lesson Lesson

		Course Activity Course Activity	Activity Course Activity
		3 days: 33–35	
3 days: 26–28	**Environmental Impacts on Evolution** *Use evidence to show that changes in the environment may result in changes in a species over time.*		
ain how genetic variation, nvironment lead to s.			Lesson Lesson
		Lesson Lesson	
		5 days: 36–40	
4 days: 29–32	**Unit Activity and Discussion—Unit 2** Unit Activity/		
l the English Bulldog *Use the ish bulldog to construct a written rm viability of the breed.*			Discussion
		1 day: 41	
		Course	
	Posttest—Unit 2 Assessment		

Unit 3: Energy Use and Organisms

Summary You'll begin this unit by learning about the conservation of energy as it relates to living thing ecosystems. You'll then develop a model to show how photosynthesis and cellular respiration transfor energy. You'll explain the relationship between aerobic and anaerobic respiration through experimenta Finally, you'll explain the importance of macronutrients and micronutrients to the human body.

Day Activity/*Objective* **Type**

	3 days: 42–44		Activity Course
Explain conservation of energy gs and different ecosystems.			Activity
		Lesson	
		Lesson	
		3 days: 52–54	
	Macronutrients and Micronutrients *Explain why the human body needs macronutrients and micronutrients to support homeostasis and the use of energy.*		
	3 days: 45–47		
ellular Respiration *Develop a tosynthesis and cellular d use energy.*			Lesson Lesson
		Lesson	
		Lesson	
		5 days: 55–59	
	Unit Activity and Discussion—Unit 3 Unit Activity/		Discussion
	4 days: 48–51		
c Respiration *Use the results of the relationship between aerobic n.*		1 day: 60	
	Posttest—Unit 3 Assessment		
		Course	

Unit 4: The Interdependence of Ecosystems

Summary In the last unit, you'll learn about biological cycles and investigate the effects of environmen on an ecosystem's major relationships, such as predator–prey, symbiosis, and mating. You'll also stud effects of environmental changes on competition of resources. Next, you'll explain the factors that affe capacity of ecosystems and analyze the effects of change on the biodiversity of an ecosystem. Finally, create a simulation to solve a biodiversity problem and use models and predictions to determine the be to the problem.

Day	Activity/*Objective*	Type
		Lesson
3 days: 61–63	*Explain how the cycling of matter h biological processes.*	Lesson
3 days: 74–76	**Factors that Affect Biodiversity** *Use evidence to explain how a change affects biodiversity of an ecosystem.*	Lesson Lesson
3 days: 64–66	**ystems** *Analyze evidence of the changes on relationships in an*	Lesson
3 days: 77–79	**Solving a Biodiversity Problem** *Create a simulation to test a solution that could relieve harmful impacts of human activity on biodiversity.*	Lesson Lesson
4 days: 67–70	**c Ecosystems** *Develop a model of aquatic ecosystem and show how e affects competition of resources.*	Lesson
3 days: 80–82	**Conserving Biodiversity** *Use evidence and scientific reasoning to choose the best solution to a biodiversity problem.*	Course Activity Course Activity
		Lesson Lesson
3 days: 71–73	**of Ecosystems** *Use the factors that affect carrying at different scales.*	
5 days: 83–87	**Unit Activity and Discussion—Unit 4** Unit Activity/	

		Discussion	89
1 day:	**Semester Review**		
88			

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1 day:			6
Day Activity/*Objective* **Type**			
			90
1 day:	**End-of-Semester Exam** Assessment		

Appendix A: Safety Notes and Disclaimer

Each Course Activity and Unit Activity that includes a lab or experiment component will highlight key s
guidelines using the safety icon ( ), which appears directly in the activity. In addition to adhering to tho
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 other skin. Wash your hands before and af
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 procedures.

• 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 damag
loss resulting from the instruction included in this course.*

Appendix B: Course Lab Materials (Semesters A and B)

Household Materials

- pen or pencil
- colored pencils or markers
- white paper
- plastic wrap
- construction paper (4 different colors—about 2 sheets of each color)
- scissors
- masking tape
- ruler with a metric scale
- measuring cup (1 cup, graduated)
- tablespoon
- stopwatch (could be a mobile app or on a computer)
- lunch-sized microwaveable container (about 5 inches wide x 4.25 inches high x 3 inches long)
- oven mitts
- tap water
- granulated sugar
- milk (any variety)
- word-processing or graphic-design software
- presentation software

Household Materials – Less Common The italicized materials below are available as a convenience in the *Edmentum Biology Kit.*

- poster board
- corkboard
- modeling clay
- firm stress ball or tennis ball
- 5 (0.25-ounce) packets dry yeast
- 5 24-ounce clear drinking glasses (either glass or plastic, as long as they can safely hold hot water)
- food thermometer (must go up to 100° Fahrenheit)
- kitchen scale (with 0.1 gram accuracy)

• photo-editing software

• *safety goggles*
• *disposable safety gloves*

Science Laboratory Materials All materials listed in italics below are available in the *Edmentum Biology Kit Microscope.*

• *compound microscope*
• *allium root tip specimen* (or 1 slide of a plant tissue specimen)
• *cork section specimen* (or 1 slide of a plant tissue specimen)
• *Zea mays leaf specimen* (or 1 slide of a plant tissue specimen)
• *human blood smear specimen* (or 1 animal tissue specimen)
• *cardiac muscle specimen* (or 1 animal tissue specimen)
• *frog skin specimen* (or 1 animal tissue specimen)
• *paramecium specimen* (or 1 slide of a single-celled organism specimen)
• *3 400-milliliter beakers* (or 3 plastic pint glasses)
• *3 test tubes* (or seven 3-ounce disposable paper cups)
• *100-milliliter graduated cylinder* (or a 1-cup measuring cup)
• *10-milliliter graduated cylinder*
• *1 stirrer* (or spoon)
• *glucose test strips* (may be purchased at any drugstore)
• *2 lactase pills* (can be found in the dietary section of any drugstore)
• *insect specimens in solution (15 diverse insects)*
• *insect dichotomous key*
• *4 petri dishes*
• *4 fossil samples*
• *forceps*
• *magnifying glass*

Appendix C: Lab Materials by Activity (Semester B)

Italicized materials listed below are available in the *Edmentum Biology Kit with Microscope.*

Unit	Activity Name	Task	Equipment List
1	Course Activity: Classifying Organisms		**** Special lab materials required. (Edmentum Biology Kit with Microscope or school lab materials)***
		Task: Classifying Organisms	Italicized items are found in the *Edmentum Biology Kit's* bags labeled "Classifying Organisms" and "Common Materials" and the box labeled "Microscope."
		Task: Simulating Adaptations in a Species	Italicized items are found in the *Edmentum Biology Kit's* bags labeled "Classifying Organisms" and "Common Materials" and the box labeled "Microscope." • *microscope* • *insect specimens in solution* • *insect dichotomous key* • *4 petri dishes*
		Task: Planning and Writing a Research Paper	none
1	Unit Activity: Organization of Organisms		
		Task: Organization of Organisms	Italicized items are found in the *Edmentum Biology Kit's* bags labeled "Organization of Organisms" and "Common Materials."
			Italicized items are found in the *Edmentum Biology Kit's* bags labeled "Organization of Organisms" and "Common Materials."
			**** Special lab materials required. (Edmentum Biology Kit with Microscope or school lab materials)*** • *4 fossil samples* • *magnifying glass*
2	Course Activity: Adaptations in a Changing Environment		none
			none
2	Course Activity: Artificial Selection and the English Bulldog		• *forceps* • *magnifying glass* • *disposable safety gloves* • *safety goggles*
			none
2	Unit Activity: Evolution	Task: Developing a Molecular Clock Model	none

Unit Activity Name Task Equipment List

3 Course Activity: Aerobic and Anaerobic Respiration

ask: Testing Yeast espiration

- 5 24-ounce clear drinking glasses (either glass or plastic, as long as they can safely hold hot water)
- 5 24-ounce clear drinking glasses (either glass or plastic, as long as they can safely hold hot water)
- 1 cup cold water (with 1 to 2 ice cubes)
- 3 cups lukewarm water (100° Fahrenheit)
- 5 (0.25-ounce) packets dry yeast
- 4 tablespoons sugar
- ruler with a metric scale
- plastic wrap (enough to cover the top of one glass)
- food thermometer (must go up to 100° Fahrenheit)
- spoon
- oven mitts

3 Unit Activity: Energy Use and Organisms

ask: Track and nalyze Your Food ntake

- measuring cups (optional)
- measuring cups (optional)
- tablespoon (optional)
- tablespoon (optional)

Task: Creating a Presentation

- presentation software

Task: Designing an Eco-Friendly Home

4 Unit Activity: The Interdependence of Ecosystems

- kitchen scale (with 0.1 gram accuracy; optional)
- ruler with a metric scale
- ruler with a metric scale
- pencil
- pencil
- poster board or graph paper

4 Course Activity: Competition in Aquatic Ecosystems

ask: Modeling a Food Web

- paper
- paper
- a pen or a pencil
- a pen or a pencil

- word-processing or graphic-design software

4 Course Activity: Solving a Biodiversity Problem

ask: Creating a eforestation imulation

none
none