

Course Description:

Biology A introduces students to the scientific method and the major concepts of biology from an historical and practical viewpoint. The three major themes of this course are the cell, the molecular basis of heredity, and the interdependence of organisms. Students who take this class will have a deeper appreciation for the complexities of living organisms. Life on this planet, unlike anywhere else in the observable universe, is complex and highly organized. Whether examining life on the molecular or the planetary level, it exhibits a highly organized structure that inspires awe by its genius and complexity. In the last 50 years, discoveries have launched new branches of biology that have transformed the daily routine, from conception to death. New challenges await, such as the current crisis in ecology, global warming, and the resurgence in viral disease. To make rational choices in the 21st century, the citizen must have a basic understanding of biological concepts and the reasoning behind them. Biology A is presented in a multimedia format using interactive modules, labs, narrated animation, text, and videos to present the study of life on this planet. Students work through and complete several self-check activities and quizzes for practice, and participate in self-reflection. In each unit, students complete the lesson quizzes and unit exam.

Materials Needed:

- household or craft items appropriate for building models of cells
- one or two live flowers
- scissors
- magnifying glass
- fruit
- a plant for observation
- mirror

Module	Lesson Title	Objectives
<i>Principles of Life</i>	Biology's Big Ideas	<ul style="list-style-type: none">• Identify the major concepts in Biology.• Make simple scientific observations.• Differentiate between biotic and abiotic factors of an ecosystem.
	Cell Theory	<ul style="list-style-type: none">• Define cell theory.• Explain the role of cell theory in scientists' study of biology.• Describe the evidence that supports the accuracy of cell theory.

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	Carbon Compounds	<ul style="list-style-type: none"> Define and identify examples of carbon compounds. Identify carbon compounds that are commonly found in cells. Describe the purpose of carbon compounds commonly found in cells.
	Cell Structures	<ul style="list-style-type: none"> Define cell organelle. Describe the function of cell organelles. Identify how cell organelles interact with one another.
	Eukaryotic Cells	<ul style="list-style-type: none"> Identify the characteristics of a eukaryotic cell. Construct a model of a eukaryotic cell.
	Prokaryotic Cells	<ul style="list-style-type: none"> Define prokaryotic. Identify the characteristics of a prokaryotic cell. Compare and contrast prokaryotic and eukaryotic cell features.
	Cell Metabolism	<ul style="list-style-type: none"> Describe and identify examples of metabolic pathways. Describe the influence of enzymes on metabolic pathways. Construct a lock and key model.
	Transport Across Membranes	<ul style="list-style-type: none"> Differentiate between active and passive transport. Describe the process of osmosis. Analyze the results of an osmosis lab.
	Photosynthesis	<ul style="list-style-type: none"> Describe the process of photosynthesis. Diagram the process of photosynthesis. Diagram how cells make ATP.
	Cellular Respiration	<ul style="list-style-type: none"> Distinguish between aerobic and anaerobic respiration. Identify and describe the processes involved in cellular respiration. Diagram the overall sequence of aerobic respiration and the Krebs cycle.
	Principles of Life Exam	
Principles of Inheritance	Cell Division	<ul style="list-style-type: none"> Explain why cells need to divide. Describe the phases of the cell cycle. Construct a model of mitosis.

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	Meiosis	<ul style="list-style-type: none"> Describe what happens during meiosis. Explain when and why meiosis occurs. Construct a model of meiosis.
	Reproduction	<ul style="list-style-type: none"> Summarize the process of sexual reproduction. Summarize the process of asexual reproduction. Compare and contrast asexual and sexual reproduction.
	Patterns of Inheritance	<ul style="list-style-type: none"> Explain the evidence used to support Mendel's law of segregation. Differentiate between an organism's genotype and phenotype. Analyze a Punnett square.
	Chromosomes	<ul style="list-style-type: none"> Label the parts of a chromosome. Define chromosomal mutation.
	Human Genetics	<ul style="list-style-type: none"> Explain how human genes are passed along. Describe common human genetic mutations. Differentiate among types of chromosomal mutation.
	The Structure of DNA	<ul style="list-style-type: none"> Describe the structure and function of DNA. Explain how DNA is replicated. Analyze the effects of DNA replication.
	From DNA to Proteins	<ul style="list-style-type: none"> Describe how DNA is transcribed to RNA. Evaluate the significance of the genetic code to scientific and medical research.
	Gene Expression	<ul style="list-style-type: none"> Describe the process of gene expression. Compare gene expression in eukaryotes and prokaryotes.
	Human Genetics	<ul style="list-style-type: none"> Explain how human genes are passed along. Describe common human genetic mutations.

Module	Lesson Title	Objectives
	Genetic Engineering	<ul style="list-style-type: none"> Describe the processes and procedures involved in genetic engineering. Identify and describe ways in which genetic engineering is used in various sciences
	The Principles of Inheritance Exam	
Plants	Classifying Life	<ul style="list-style-type: none"> Explain the role of classification in the field of biology. Describe the system used to classify organisms. Explain how plants differ from animals in their characteristics.
	Plant Classification	<ul style="list-style-type: none"> Describe how plants are classified. Create and label a plant diagram. Use plant diagrams to classify and identify a plant.
	Seedless Plants	<ul style="list-style-type: none"> Describe the characteristics of lycophytes. Compare lycophytes, horsetails and ferns. Diagram the life cycle of seedless plants.
	Seed Plants	<ul style="list-style-type: none"> Describe the characteristics of spermatophytes/seed plants. Diagram the life cycle of seed plants.
	Gymnosperms	<ul style="list-style-type: none"> Describe the characteristics of a gymnosperm. Identify examples of gymnosperms.
	Angiosperm	<ul style="list-style-type: none"> Describe the characteristics of an angiosperm. Identify the parts of a flower. Describe the parts of a seed.

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	Seed Dispersal	<ul style="list-style-type: none"> Explain how seeds and fruits form. Compare the methods by which seeds are dispersed.
	Plant Tropisms	<ul style="list-style-type: none"> Define and identify examples of tropism. Define phototropism. Define gravitropism. Investigate and describe phototropism in a particular plant.
	Seasonal Changes in Plants	<ul style="list-style-type: none"> Identify examples of seasonal changes. Identify physical changes to plants caused by the changing of seasons. Explain what causes seasonal physical changes in plants.
	Plants and Humans	<ul style="list-style-type: none"> Describe the ways in which plants are important to humans.
	Plants Exam	
Classification	Classification Systems	<ul style="list-style-type: none"> Explain the Linnaean scheme for classifying organisms. Name and describe the levels of classification. Define phylogeny. Differentiate between Linnaean scheme and phylogeny.
	Kingdoms	<ul style="list-style-type: none"> Name the six kingdoms in the Linnaean schema for classification. Identify key characteristics of the six kingdom. Classify organisms, based on characteristics, into the correct kingdoms.
	Eubacteria	<ul style="list-style-type: none"> Describe the characteristics of eubacteria.
	Archaeobacteria	<ul style="list-style-type: none"> Describe the characteristics of archaeobacterial. Differentiate between archaeobacterial and eubacteria.

Module	Lesson Title	Objectives
	Protista	<ul style="list-style-type: none"> Describe the characteristics of protists. Label an image of a protist.
	Fungi	<ul style="list-style-type: none"> Describe the characteristics of fungi. Describe the role of fungi in ecosystems and food webs.
	Plantae	<ul style="list-style-type: none"> Describe the characteristics of plants. Describe the role of plants in food webs and ecosystems.
	Animalia	<ul style="list-style-type: none"> Describe the characteristics of animals. Classify animals as vertebrates or invertebrates.
	Viruses	<ul style="list-style-type: none"> Describe the characteristics of viruses. Describe the lytic and lysogenic cycles of virus reproduction. Compare the lytic and lysogenic pathways for virus multiplication.
	Protozoa	<ul style="list-style-type: none"> Describe the characteristics of protozoa. Explain how protozoans impact the health of human beings.
	Classification Exam	
Animal Invertebrates	Overview of Animal Kingdom	<ul style="list-style-type: none"> Describe the levels of organization in animals. List and describe the features that animals have in common.
	Body Plans	<ul style="list-style-type: none"> Define symmetry. Classify animals based on their symmetry.
	Phylum Placozoa	<ul style="list-style-type: none"> Describe the features of organisms in the Placozoa phylum. Draw an example of a species in the Placozoa phylum.

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	Phylum Porifera	<ul style="list-style-type: none"> Describe the features of organisms in the Porifera phylum. Draw an example of a species in the Porifera phylum.
	Phylum Cnidarian	<ul style="list-style-type: none"> Describe the features of organisms in the Cnidarian phylum. Draw an example of a species in the Cnidarian phylum.
	Phylum Rotifera	<ul style="list-style-type: none"> Describe the features of organisms in the Rotifera phylum. Draw an example of a species in the Rotifera phylum.
	Phylum Mollusca	<ul style="list-style-type: none"> Describe the features of organisms in the Mollusca phylum. Draw an example of a species in the Mollusca phylum.
	Phylum Annelida and Platyhelminthes and Nemotoda	<ul style="list-style-type: none"> Describe the features of organisms in the Annelida, Platyhelminthes and Nemotoda phylums. Differentiate between the three "worm" phyla. Draw an example of species in the Annelida, Platyhelminthes and Nemotoda phylums.
	Phylum Echinodermata	<ul style="list-style-type: none"> Describe the features of organisms in the echinodermata phylum. Draw an example of a species in the echinodermata phylum.
	Phylum Chordata	<ul style="list-style-type: none"> Describe the features of organisms in the Chordata phylum. Draw an example of a species in the Chordata phylum.
	Animal Invertebrates Exam	
Animal Vertebrates	The First Vertebrates	<ul style="list-style-type: none"> Describe the first vertebrates. Describe the characteristics of vertebrates. Describe how vertebrates differ from invertebrates.

Module	Lesson Title	Objectives
	Fish	<ul style="list-style-type: none"> Describe the characteristics of fish. Compare cartilaginous and bony fish.
	Amphibians	<ul style="list-style-type: none"> Describe the characteristics of amphibians. Differentiate among the three orders of amphibians. Diagram the life cycle of an amphibian.
	Reptiles	<ul style="list-style-type: none"> Describe the characteristics of reptiles. Hypothesize about the importance of the amniotic egg.
	Birds	<ul style="list-style-type: none"> Describe the characteristics birds. Compare the three types of bird feathers. Investigate the importance of beak shape and size in birds.
	Mammals	<ul style="list-style-type: none"> Describe the characteristics mammals. Differentiate among the three classes of mammals.
	The Primates	<ul style="list-style-type: none"> Differentiate between the two sub-orders of primates. Describe and classify the first hominids.
	Skeletal Systems	<ul style="list-style-type: none"> Describe the purpose of the skeletal system. Identify the major vertebrate bones in a diagram. Distinguish among the types of joints.
	Muscular Systems	<ul style="list-style-type: none"> Define the three kinds of muscles and their purpose. Identify the locations and functions of major muscle groups.
	Sensory Reception	<ul style="list-style-type: none"> Identify and compare the five senses of vertebrates. Describe sensory receptors. Assess how stimuli affect sensory receptors.
	Animal Vertebrates Exam	

Module	Lesson Title	Objectives
Semester Exam		