

Course Description:

Biology B is a continuation of the basic course in biology, Biology A. The major concepts covered are population dynamics and evolution. Students explore population dynamics through the study of mutualism, predation, parasitism, and competition. The theory of evolution is presented, along with the many evidences and details that make evolution the backbone of modern biology. From biochemistry to evolution, biology fascinates people. Biochemists first astounded the world by showing that life obeys the same chemical principles as all creation, but that life engineers chemistry to its own needs. Decades later, Darwin shocked the world by suggesting that life evolves according to the conditions of the environment it inhabits. Evolution, often debated and derided, has survived to become a key concept of biology. This second course in biology examines the wonder of life and its mechanisms. Students work through and complete several self-check activities and quizzes for practice, and participate in self-reflection. In each unit, students complete lesson quizzes and unit exam.

Materials Needed:

- stopwatch or timer
- jacket or sweatshirt
- thermometer (used for taking your temperature)
- glue or tape
- scissors

Module	Lesson Title	Objectives
Human Body	Homeostasis	<ul style="list-style-type: none"> • Identify the processes involved in maintaining homeostasis. • Investigate how homeostasis maintains a stable internal body temperature, when external temperatures change.
	Circulatory System	<ul style="list-style-type: none"> • Identify and describe the major structures of the circulatory system. • Diagram the circulatory system.
	Respiratory System	<ul style="list-style-type: none"> • Identify and describe the major structures of the respiratory system. • Explain how gas is exchanged in the lungs and between the blood and body cells. • Create a model of the human lungs.

Module	Lesson Title	Objectives
	Digestive System	<ul style="list-style-type: none"> Identify and describe the major structures of the digestive system. Explain why enzymes are important to the digestion process. Diagram the digestive system.
	Human Nutrition	<ul style="list-style-type: none"> Identify the nutrients humans need. Construct a healthy menu for a week.
	Nervous System	<ul style="list-style-type: none"> Identify and describe the major structures of the nervous system. Differentiate between the central nervous system and peripheral nervous system. Differentiate between the somatic nervous system and the autonomic nervous system.
	Human Brain	<ul style="list-style-type: none"> Describe the functions of and identify the parts of the brain. Construct a model of the human brain.
	Endocrine System	<ul style="list-style-type: none"> Identify and describe the major hormones of the endocrine system. Cite evidence of hormones controlling body processes.
	Reproduction in Humans	<ul style="list-style-type: none"> Compare and contrast the male and female reproduction systems. Explain the processes involved in human reproduction.
	Development in Humans	<ul style="list-style-type: none"> Compare the phases of human development from embryo through adulthood.
	Human Body Exam	
Humans and Diseases	Immune System	<ul style="list-style-type: none"> Identify and describe the major structures of the immune system. Critique how the immune system responds to antigens. Differentiate between natural immunity and acquired immunity.
	Infectious Disease	<ul style="list-style-type: none"> Explain the relationship between pathogens and infectious diseases. Compare four kinds of pathogens. Compare major infectious diseases.

Module	Lesson Title	Objectives
	Flu	<ul style="list-style-type: none"> Describe how the flu affects individuals. Assess the risk of flu epidemics in various countries.
	HIV	<ul style="list-style-type: none"> Identify how HIV affects the immune system. Assess the risk of HIV infection to populations and how the risk can be lowered.
	Vaccines	<ul style="list-style-type: none"> Identify health benefits of using vaccines for individuals and populations. Compare disease outbreaks in areas where vaccine use is widespread to areas where vaccine use is rare.
	Non-Infectious Disease	<ul style="list-style-type: none"> Describe how non-infectious diseases occur. Compare the effects of major non-infectious diseases.
	Autoimmune Diseases	<ul style="list-style-type: none"> Describe common factors that contribute to autoimmune diseases. Describe 3 autoimmune diseases.
	Cancers	<ul style="list-style-type: none"> Identify the various causes of cancer in humans. Describe the effects of cancer on the body. Describe prostate cancer, colorectal cancer and breast cancer.
	Cardiovascular Disease	<ul style="list-style-type: none"> Identify the risks of cardiovascular disease. Describe the symptoms and treatment of cardiovascular disease.
	Alcohol and Tobacco	<ul style="list-style-type: none"> Identify the warning signs of alcohol and tobacco abuse. Compare the effects of alcohol abuse and tobacco abuse.
	Humans & Diseases Exam	

Module	Lesson Title	Objectives
<i>Principles of Evolution</i>	Origin of Life	<ul style="list-style-type: none"> Identify the characteristics of the atmosphere needed to support life. Describe the first living cells. Cite evidence supporting life began 3.8 billion years ago.
	Earth's Life History	<ul style="list-style-type: none"> Differentiate between the eras of the geological time scale. Explain how fossils are used in geological dating.
	Charles Darwin	<ul style="list-style-type: none"> Identify how organisms can change based on adaptations and mutations. Support Darwin's theory of evolution with examples and details.
	Hardy-Weinberg Equilibrium	<ul style="list-style-type: none"> Explain the Hardy-Weinberg principle of equilibrium. Support the Hardy-Weinberg principle of equilibrium with examples and details.
	Population Evolution	<ul style="list-style-type: none"> Describe the gene pool. Defend the statement "Individuals do not evolve populations do."
	Types of Selection	<ul style="list-style-type: none"> Differentiate between types of selection including: extreme phenotypes, sexual selection, directional selection and natural selection.
	Genetic Drift	<ul style="list-style-type: none"> Describe genetic drift. Compare different types of genetic drift initiated by bottleneck events, the founder effect, and inbreeding.
	Comparative Morphology	<ul style="list-style-type: none"> Compare the different types of morphological traits. Compare species evolution based on morphology.

Module	Lesson Title	Objectives
	Comparative Biochemistry	<ul style="list-style-type: none"> Compare species at the molecular level. Describe species evolution based on molecular clocks.
	Human Evolution	<ul style="list-style-type: none"> Compare and contrast Neanderthal and Cro-Magnon species. Create a map of hominid migration.
	Principles of Evolution Exam	
<i>Populations and Communities</i>	Characteristics of Populations	<ul style="list-style-type: none"> Define population size, population density, and distribution pattern and age distribution. Construct a model to estimate a population's size.
	Population Growth	<ul style="list-style-type: none"> Describe how population size changes. Create graphs to display exponential population growth.
	Population Limits	<ul style="list-style-type: none"> Define limiting factor. Differentiate between density-dependent and density-independent factors.
	Population Growth Projections	<ul style="list-style-type: none"> Compare human population growth to the population growth of another animal.
	Community	<ul style="list-style-type: none"> Define habitat, niche, and community. Assess how species interact in a community.
	Symbiotic Relationships	<ul style="list-style-type: none"> Compare mutualism, parasitism, and commensalism. Cite examples of symbiotic relationships.
	Predation and Parasitism	<ul style="list-style-type: none"> Describe how predators and prey rely on each other. Prove that predator and prey interactions can affect population size. Prove that parasitism can affect population size.

Module	Lesson Title	Objectives
	Community Stability	<ul style="list-style-type: none"> Describe a stable community. Create a model of a stable ecosystem.
	Succession	<ul style="list-style-type: none"> Explain primary and secondary succession. Create a model of ecological succession in an ecosystem.
	Patterns of Biodiversity	<ul style="list-style-type: none"> Draw conclusions as to why biodiversity is highest in the tropics.
	Populations & Communities Exam	
Biomes	Trophic Levels	<ul style="list-style-type: none"> Compare the four trophic levels. Create a model of an ecosystem using trophic levels.
	Biogeochemical Cycles	<ul style="list-style-type: none"> Illustrate and describe the hydrological, sedimentary, carbon and nitrogen cycles. Assess how the biogeochemical cycles are vital to an ecosystem.
	Characteristics of Biomes	<ul style="list-style-type: none"> Identify the main characteristics of aquatic and terrestrial biomes. Analyze the adaptations of organisms in a biome.
	Deserts	<ul style="list-style-type: none"> Identify characteristics of the desert. Analyze how desert characteristics affect life there.
	The Mediterranean Biome and Grasslands	<ul style="list-style-type: none"> Identify characteristics of the Mediterranean biome and grasslands. Analyze how characteristics of the Mediterranean biome and grasslands affect life there.

Module	Lesson Title	Objectives
	Rainforests and Broadleaf Forests	<ul style="list-style-type: none"> Identify characteristics of rainforests and broadleaf forests. Analyze how rainforest and broadleaf forest characteristics affect life there.
	Coniferous Forests	<ul style="list-style-type: none"> Identify characteristics of the coniferous forest. Analyze how coniferous forest characteristics affect life there.
	Tundra	<ul style="list-style-type: none"> Identify characteristics of the tundra. Analyze how tundra characteristics affect life there.
	Freshwater Biome	<ul style="list-style-type: none"> Identify characteristics of the freshwater biome. Analyze how freshwater biome characteristics affect life there.
	Marine Biome	<ul style="list-style-type: none"> Identify characteristics of the marine biome. Analyze how marine biome characteristics affect life there.
	Biomes Exam	
Human Impact on the Environment	Human Population Growth	<ul style="list-style-type: none"> Describe the impact of the exploding human population of the Earth.
	Air Pollution	<ul style="list-style-type: none"> Identify the causes of air pollution. Cite evidence of how air pollution is being controlled.
	Deforestation	<ul style="list-style-type: none"> Identify the causes of deforestation. Describe the impact of deforestation on the environment.
	Water Pollution	<ul style="list-style-type: none"> Identify the causes of water pollution. Cite evidence of how water pollution is being controlled.

Module	Lesson Title	Objectives
	Water Shortage	<ul style="list-style-type: none">• Identify the causes of water shortage.• Describe the impact of water shortage on the environment.
	Fossil Fuels	<ul style="list-style-type: none">• Identify how fossil fuels are formed.• Describe the impact of fossil fuel usage on the environment.
	Alternate Energy Sources	<ul style="list-style-type: none">• Identify alternate energy sources.• Compare and contrast the usability of alternate energy sources.
	Global Warming	<ul style="list-style-type: none">• Identify the causes of global warming.• Cite evidence of how global warming is being controlled.
	Coral Reef Damage	<ul style="list-style-type: none">• Identify how coral reefs are damaged.• Describe the impact of coral reef damage on the global environment.
	Overpopulation	<ul style="list-style-type: none">• Identify the causes of overpopulation.• Cite evidence of how overpopulation is being controlled.
	Human Impact on the Environment Exam	
Semester Exam		