

Curriculum at a Glance

Biology

Level: 300

Grade 9

Biology is a one-year course for grade 9 and serves as the 9th-grade science requirement. Biology is the science of organisms, and students will be exposed to the great diversity which exists among organisms, with an overview of topics ranging from one-celled organisms through the human being. Emphasis is also placed on the environment as it relates to all organisms. Students will be required to complete homework assignments and participate in laboratory sessions. They will be expected to cooperate as group members, use equipment properly, and submit lab reports. Students will also be responsible for submitting research projects and essays.

Unit Name	Content
Introduction to Biology	<ul style="list-style-type: none">● Course expectations, and introduction of units of study and nature of science
Characteristics of Life and Classification	<ul style="list-style-type: none">● Characteristics of living things● Diversity of how organisms demonstrate the characteristics of life● Taxonomy & classification● Evolutionary themes in classification
Biochemistry	<ul style="list-style-type: none">● Atomic structure & elements essential to life● Inorganic chemistry/properties of water● Structure of the four main types of organic molecules● Functions of organic molecules in living systems
Ecosystems, Energy Flow & Conservation	<ul style="list-style-type: none">● Introduction to basic ecology● Trophic levels & inter-relationships● The cellular processes of photosynthesis and respiration involving the transformation of matter and energy● Energy cannot be created or destroyed; however, energy can be converted from one form to another. Energy enters the Earth system primarily as solar radiation, is captured by materials and

	<p>photosynthetic processes, and eventually is transformed into heat</p>
Cells	<ul style="list-style-type: none"> ● Structure of the plasma membrane ● Transport of materials into and out of cells ● Diffusion, osmosis, facilitated diffusion, active transport, endo- and exocytosis. ● Prokaryotic vs Eukaryotic Cell ● Plant vs Animal Cells ● Structure and function of organelles in eukaryotes ● Interrelationships of organelles in the production of proteins for use inside or outside of the cell
Cell Cycle	<ul style="list-style-type: none"> ● Describe the general role of DNA and RNA in protein synthesis ● Chemical and structural properties of DNA in all living organisms allow the transfer of genes from one organism to another ● GMOs- risks and benefits of altering the genetic composition and cell products of existing organisms ● Prokaryotic Cell Division - Binary Fission ● Eukaryotic Cell Division - Mitosis
Reproduction and Meiosis	<ul style="list-style-type: none"> ● Meiosis and the production of gametes ● Asexual vs sexual reproduction ● Pros & cons of various types of asexual reproduction ● Pollination and double fertilization in plants ● Evolution of sexual reproduction in animals ● Human reproduction & embryology
Genetics and Heredity	<ul style="list-style-type: none"> ● Introduction to Mendelian genetics ● Basic genetic transmission/Punnett squares ● Monohybrid & dihybrid crosses ● Complete dominance, sex-linked, multiple alleles, incomplete dominance, codominance ● Expression of a pair of genes may be influenced by other genes as well as by the environment.

	<ul style="list-style-type: none"> ● Genetic disorders
Evolution and Natural Selection	<ul style="list-style-type: none"> ● Darwin vs Lamarck ● Theory of natural selection ● Evidence of evolution ● Real-life examples of natural selection
Digestion	<ul style="list-style-type: none"> ● Nutritional needs of human beings ● Structures and associated functions of the human digestive system ● The nutritional requirements of autotrophs and heterotrophs and comparison of the many ways organisms meet their nutritional needs
Transport and Circulation	<ul style="list-style-type: none"> ● Transport systems in vascular plants ● Evolution of circulatory systems in simple animals ● Components of human blood and blood types ● Structure and function of arteries, capillaries and veins ● Comparison and evolution of vertebrate hearts ● Pulmonary vs systemic circulation
Gas Exchange and Excretion	<ul style="list-style-type: none"> ● Basic concepts of gas exchange in living things ● Diversity of respiratory systems in organisms ● Anatomy & physiology of human respiratory system ● Excretory systems in organisms/unity & diversity ● Various methods of removing nitrogenous wastes ● Structure of a nephron ● Anatomy & physiology of human excretory system
Nerves, Muscles, Bones	<ul style="list-style-type: none"> ● Structure of a neuron and its relationship to its function ● Pathway of an impulse through the nervous system and the types of neurons that transport these impulses ● Voluntary responses vs. Reflex responses ● Different types of joints allowing for movement ● Compare and contrast the endoskeleton and exoskeleton, identifying the advantages and disadvantages of each

	<ul style="list-style-type: none">● The skeletal and muscular systems in the human and their interaction to create locomotion● Three types of vertebrate muscle and their specific roles
Human Population Growth and Ecology	<ul style="list-style-type: none">● Living organisms have the capability of producing populations of unlimited size, but the environment can support only a limited number of individuals from each species● Describe the factors that affect the carrying capacity of the environment● Explain how change in population density is affected by emigration, immigration, birth rate and death rate, and relate these factors to the exponential growth of human populations