

Course: 2000310 Biology 1

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BASIC INFORMATION

Course Title:	Biology 1
Course Number:	2000310
Course Abbreviated Title:	BIO 1
Course Path:	Section: Grades PreK to 12 Education Courses » Grade Group: Grades 9 to 12 and Adult Education Courses » Subject: Science » SubSubject: Biological Sciences »
Number of Credits:	One credit (1)
Course length:	Year (Y)
Course Type:	Core
Course Level:	2
Status:	State Board Approved
General Notes:	Laboratory investigations which include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course.

STANDARDS (61)

[SC.912.N.1 The Practice of Science](#)

SC.912.N.1.1 :	Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: <ol style="list-style-type: none">1. pose questions about the natural world,2. conduct systematic observations,3. examine books and other sources of information to see what is already known,4. review what is known in light of empirical evidence,5. plan investigations,6. use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs),7. pose answers, explanations, or descriptions of events,8. generate explanations that explicate or describe natural phenomena (inferences),9. use appropriate evidence and reasoning to justify these explanations to others,10. communicate results of scientific investigations, and11. evaluate the merits of the explanations produced by others.
SC.912.N.1.3 :	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4 :	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.6 :	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.

[SC.912.N.2 The Characteristics of Scientific Knowledge](#)

SC.912.N.2.1 :	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC.912.N.2.2 :	Identify which questions can be answered through science and which questions are outside the boundaries of

scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.

SC.912.N.3 The Role of Theories, Laws, Hypotheses, and Models

<u>SC.912.N.3.1 :</u>	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
<u>SC.912.N.3.4 :</u>	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions.

SC.912.E.7 Earth Systems and Patterns

<u>SC.912.E.7.1 :</u>	Analyze the movement of matter and energy through the different biogeochemical cycles, including water and carbon.
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SC.912.L.14 Organization and Development of Living Organisms

<u>SC.912.L.14.1 :</u>	Describe the scientific theory of cells (cell theory) and relate the history of its discovery to the process of science.
<u>SC.912.L.14.2 :</u>	Relate structure to function for the components of plant and animal cells. Explain the role of cell membranes as a highly selective barrier (passive and active transport).
<u>SC.912.L.14.3 :</u>	Compare and contrast the general structures of plant and animal cells. Compare and contrast the general structures of prokaryotic and eukaryotic cells.
<u>SC.912.L.14.4 :</u>	Compare and contrast structure and function of various types of microscopes.
<u>SC.912.L.14.6 :</u>	Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health.
<u>SC.912.L.14.7 :</u>	Relate the structure of each of the major plant organs and tissues to physiological processes.
<u>SC.912.L.14.26 :</u>	Identify the major parts of the brain on diagrams or models.
<u>SC.912.L.14.36 :</u>	Describe the factors affecting blood flow through the cardiovascular system.
<u>SC.912.L.14.52 :</u>	Explain the basic functions of the human immune system, including specific and nonspecific immune response, vaccines, and antibiotics.

SC.912.L.15 Diversity and Evolution of Living Organisms

<u>SC.912.L.15.1 :</u>	Explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observed evolutionary change.
<u>SC.912.L.15.4 :</u>	Describe how and why organisms are hierarchically classified and based on evolutionary relationships.
<u>SC.912.L.15.5 :</u>	Explain the reasons for changes in how organisms are classified.
<u>SC.912.L.15.6 :</u>	Discuss distinguishing characteristics of the domains and kingdoms of living organisms.
<u>SC.912.L.15.8 :</u>	Describe the scientific explanations of the origin of life on Earth.
<u>SC.912.L.15.10 :</u>	Identify basic trends in hominid evolution from early ancestors six million years ago to modern humans, including brain size, jaw size, language, and manufacture of tools.
<u>SC.912.L.15.13 :</u>	Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success.
<u>SC.912.L.15.14 :</u>	Discuss mechanisms of evolutionary change other than natural selection such as genetic drift and gene flow.
<u>SC.912.L.15.15 :</u>	Describe how mutation and genetic recombination increase genetic variation.

SC.912.L.16 Heredity and Reproduction

<u>SC.912.L.16.1 :</u>	Use Mendel's laws of segregation and independent assortment to analyze patterns of inheritance.
<u>SC.912.L.16.2 :</u>	Discuss observed inheritance patterns caused by various modes of inheritance, including dominant, recessive, codominant, sex-linked, polygenic, and multiple alleles.
<u>SC.912.L.16.3 :</u>	Describe the basic process of DNA replication and how it relates to the transmission and conservation of the genetic information.
<u>SC.912.L.16.4 :</u>	Explain how mutations in the DNA sequence may or may not result in phenotypic change. Explain how mutations in gametes may result in phenotypic changes in offspring.
<u>SC.912.L.16.5 :</u>	Explain the basic processes of transcription and translation, and how they result in the expression of genes.
<u>SC.912.L.16.8 :</u>	Explain the relationship between mutation, cell cycle, and uncontrolled cell growth potentially resulting in cancer.
<u>SC.912.L.16.9 :</u>	Explain how and why the genetic code is universal and is common to almost all organisms.

SC.912.L.16.10 :	Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.
SC.912.L.16.13 :	Describe the basic anatomy and physiology of the human reproductive system. Describe the process of human development from fertilization to birth and major changes that occur in each trimester of pregnancy.
SC.912.L.16.14 :	Describe the cell cycle, including the process of mitosis. Explain the role of mitosis in the formation of new cells and its importance in maintaining chromosome number during asexual reproduction.
SC.912.L.16.16 :	Describe the process of meiosis, including independent assortment and crossing over. Explain how reduction division results in the formation of haploid gametes or spores.
SC.912.L.16.17 :	Compare and contrast mitosis and meiosis and relate to the processes of sexual and asexual reproduction and their consequences for genetic variation.

SC.912.L.18 Matter and Energy Transformations

SC.912.L.18.1 :	Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules.
SC.912.L.18.7 :	Identify the reactants, products, and basic functions of photosynthesis.
SC.912.L.18.8 :	Identify the reactants, products, and basic functions of aerobic and anaerobic cellular respiration.
SC.912.L.18.9 :	Explain the interrelated nature of photosynthesis and cellular respiration.
SC.912.L.18.10 :	Connect the role of adenosine triphosphate (ATP) to energy transfers within a cell.
SC.912.L.18.11 :	Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, and their effect on enzyme activity.
SC.912.L.18.12 :	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.

MA.912.S.1 Formulating Questions

MA.912.S.1.2 :	Determine appropriate and consistent standards of measurement for the data to be collected in a survey or experiment.
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MA.912.S.3 Summarizing Data (Descriptive Statistics)

MA.912.S.3.2 :	<p>Collect, organize, and analyze data sets, determine the best format for the data and present visual summaries from the following:</p> <ul style="list-style-type: none"> • bar graphs • line graphs • stem and leaf plots • circle graphs • histograms • box and whisker plots • scatter plots • cumulative frequency (ogive) graphs
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LA.910.4.2 Informative

LA.910.4.2.2 :	The student will record information and ideas from primary and/or secondary sources accurately and coherently, noting the validity and reliability of these sources and attributing sources of information;
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SC.912.L.17 Interdependence

SC.912.L.17.2 :	Explain the general distribution of life in aquatic systems as a function of chemistry, geography, light, depth, salinity, and temperature.
SC.912.L.17.4 :	Describe changes in ecosystems resulting from seasonal variations, climate change and succession.
SC.912.L.17.5 :	Analyze how population size is determined by births, deaths, immigration, emigration, and limiting factors (biotic and abiotic) that determine carrying capacity.
SC.912.L.17.8 :	Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.
SC.912.L.17.9 :	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.
SC.912.L.17.11 :	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.
SC.912.L.17.13 :	Discuss the need for adequate monitoring of environmental parameters when making policy decisions.
SC.912.L.17.20 :	Predict the impact of individuals on environmental systems and examine how human lifestyles affect

sustainability.

LA.910.2.2 Nonfiction

LA.910.2.2.3 :

The student will organize information to show understanding or relationships among facts, ideas, and events (e.g., representing key points within text through charting, mapping, paraphrasing, summarizing, comparing, contrasting, or outlining);

HE.912.C.1 Comprehend concepts related to health promotion and disease prevention to enhance health.

HE.912.C.1.3 :

Evaluate how environment and personal health are interrelated.

HE.912.C.1.4 :

Analyze how heredity and family history can impact personal health.

HE.912.C.1.8 :

Analyze strategies for prevention, detection, and treatment of communicable and chronic diseases.

RELATED GLOSSARY TERM DEFINITIONS (73)

Area:	The number of square units needed to cover a surface.
Bar graph:	A graph that uses either vertical or horizontal bars to display countable data
Chart:	A data display that presents information in columns and rows.
Circle graph:	A data display that divides a circle into regions representation a portion to the total set of data. The circle represents the whole set of data.
Histogram:	A bar graph that shows how many data values fall into a certain interval. The number of data items in an interval is a frequency. The width of the bar represents the interval, while the height indicates the number of data items, or frequency, in that interval.
Line graph:	A collection of an infinite number of points in a straight pathway with unlimited length and having no width.
Plot:	To locate a point by means of coordinates, or a curve by plotted points, or to represent an equation by means of a curve so constructed.
Rate:	A ratio that compares two quantities of different units.
Scatter plot:	A graph of paired data in which the data values are plotted as points in (x, y) format.
Set:	A set is a finite or infinite collection of distinct objects in which order has no significance.
Abiotic:	An environmental factor not associated with or derived from living organisms.
Activation energy:	The least amount of energy required to start a particular chemical reaction.
Adenosine triphosphate (ATP):	An organic compound that is composed of adenosine and three phosphate groups. It serves as a source of energy for many metabolic processes. ATP releases energy when it is broken down into ADP and phosphate by hydrolysis during cell metabolism.
Aerobic:	Occurring in the presence of oxygen or requiring oxygen to live. In aerobic respiration, which is the process used by the cells of most organisms, the production of energy from glucose metabolism requires the presence of oxygen.
Anaerobic :	Occurring in the absence of oxygen or not requiring oxygen to live. Anaerobic bacteria produce energy from food molecules without the presence of oxygen.
Anatomy:	The scientific study of the shape and structure of organisms and their parts.
Aquatic:	In or on the water
Asexual reproduction:	A form of reproduction in which new individuals are formed without the involvement of gametes.
Biotechnology:	The manipulation (as through genetic engineering) of living organisms or their components to produce useful usually commercial products (as pest resistant crops, new bacterial strains, or novel pharmaceuticals).
Biotic:	Factors in an environment relating to, caused by, or produced by living organisms.
Cardiovascular system:	The bodily system consisting of the heart, blood vessels, and blood that circulates blood throughout the body, delivers nutrients and other essential materials to cells, and removes waste products.
Catalyst:	A substance that speeds up or slows down the rate of a reaction without being consumed or altered.
Cell:	The smallest structural unit of an organism that is capable of independent functioning, consisting of cytoplasm and various organelles, all surrounded by a semipermeable cell membrane, which in some cells, is surrounded by a cell wall
Chromosome:	A structure in living cells that consists of a single molecule of DNA bonded to various proteins and that carries the genes determining heredity.

Codominant:	Relating to two alleles of a gene pair in a heterozygote that are both fully expressed.
Consumer:	An organism that feeds on other organisms for food.
Current :	The amount of electric charge flowing past a specified circuit point per unit time.
Decomposer :	Any organism that feeds or obtains nutrients by breaking down organic matter from dead organisms.
DNA:	Deoxyribonucleic acid; a nucleic acid that is genetic material; present in all organisms.
Dominance:	Tendency of certain (dominant) alleles to mask the expression of their corresponding (recessive) alleles.
Embryology:	The branch of biology that deals with the formation, early growth, and development of living organisms.
Energy:	The capacity to do work.
Environment:	The sum of conditions affecting an organism, including all living and nonliving things in an area, such as plants, animals, water, soil, weather, landforms, and air.
Enzyme:	Any of numerous proteins produced in living cells that accelerate or catalyze chemical reactions.
Evolution :	A theory that the various types of species arise from pre-existing species and that distinguishable characteristics are due to modifications through successive generations.
Fertilization:	The act or process of initiating biological reproduction by insemination or pollination.
Fossil:	A whole or part of an organism that has been preserved in sedimentary rock.
Freeze:	To pass from the liquid to the solid state by loss of heat from the substance/system.
Gamete:	A reproductive cell having the haploid number of chromosomes, especially a mature sperm or egg capable of fusing with a gamete of the opposite sex to produce the fertilized egg.
Genetic:	Affecting or determined by genes.
Haploid:	Having a single set of each chromosome in a cell or cell nucleus. In most animals, only the gametes (reproductive cells) are haploid.
Hominid:	A group of primates of the family Hominidae, which includes modern humans.
Immune system:	The body system that protects the organism by distinguishing foreign tissue and neutralizing potentially pathogenic organisms or substances. The immune system includes organs such as the skin and mucous membranes, which provide an external barrier to infection, cells involved in the immune response, such as lymphocytes, and cell products such as lymphokines.
Inference :	The act of reasoning from factual knowledge or evidence.
Investigation :	A systematic process that uses various types of data and logic and reasoning to better understand something or answer a question.
Law :	A statement that describes invariable relationships among phenomena under a specified set of conditions.
Light:	Electromagnetic radiation that lies within the visible range.
Matter:	Substance that possesses inertia and occupies space, of which all objects are constituted.
Meiosis:	The process of nuclear division in cells during which the number of chromosomes is reduced by half.
Membrane:	A thin layer of tissue that surrounds or lines a cell, a group of cells, or a cavity; any barrier separating two fluids.
Microscope:	An instrument with lenses and light that is used to observe objects too small to be visible with only the eyes.
Mitosis:	A process of nuclear division in eukaryotic cells during which the nucleus of a cell divides into two nuclei, each with the same number of chromosomes.
Model :	A systematic description of an object or phenomenon that shares important characteristics with the object or phenomenon. Scientific models can be material, visual, mathematical, or computational and are often used in the construction of scientific theories.
Mutation:	A change in genetic sequence.
Natural selection:	The theory stating every organism displays slight variations from related organisms, and these variations make an organism more or less suited for survival and reproduction in specific habitats.
Nonrenewable resource:	A resource that can only be replenished over millions of years.
Observation :	What one has observed using senses or instruments.
Offspring:	The progeny or descendants of an animal or plant considered as a group.
Organ:	A structure containing different tissues that are organized to carry out a specific function of the body (e.g., heart, lungs, brain, etc.)
Organism:	An individual form of life of one or more cells that maintains various vital processes necessary for life.
pH:	The measure of the acidity or alkalinity of a solution.
Photosynthesis:	A chemical process by which plants use light energy to convert carbon dioxide and water into carbohydrates (sugars).
Physiology:	The scientific study of an organism's vital functions, including growth, development, reproduction, the absorption and processing of nutrients, the synthesis and distribution of proteins and other organic molecules, and the

functioning of different tissues, organs, and other anatomic structures.

Polygenic:	Any of a group of nonallelic genes that collectively control the inheritance of a quantitative character or modify the expression of a qualitative character.
Producer :	An organism, usually a plant or bacterium, that produces organic compounds from simple inorganic molecules and energy (typically light energy) from the environment.
Recessive:	An allele for a trait that will be masked unless the organism is homozygous for this trait.
Replication:	In scientific research, conducting an experiment to confirm findings or to ensure accuracy. In molecular biology, the process by which genetic material is copied in cells.
Reproductive system:	The system of organs involved with animal reproduction, especially sexual reproduction.
Scientist:	A person with expert knowledge of one or more sciences, that engages in processes to acquire and communicate knowledge.
Space:	The limitless expanse where all objects and events occur. Outer space is the region of the universe beyond Earth's atmosphere.
Theory :	A set of statements or principles devised to explain a group of facts or phenomena, especially one that has been repeatedly tested or is widely accepted and can be used to make predictions about natural phenomena.
Tissue:	Similar cells acting to perform a specific function.
Vaccine:	A preparation of a weakened or killed pathogen, such as a bacterium or virus, or of a portion of the pathogen's structure, that stimulates immune cells to recognize and attack it, especially through antibody production.



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