Course/Grade Level: Biology Curriculum (9th Grade)

BIO.9.1 Students will develop, operate, evaluate and analyze scientific investigations.

Students will…

BIO.9.1.1 ▲ actively engages in investigations, including developing questions, gathering and analyzing data, and designing and conducting research. (HS.1.1.2)

Instructional Example: Students will construct an experimental process and demonstrate the use of the hypotheses, dependent and independent variables, analysis of data and the verification of support or rejection to the hypothesis.

BIO.9.1.2 ▲ actively engages in using technological tools and mathematics in their own scientific investigations. (HS.1.1.3)

Additional Specificity: Recognizes that the accuracy and precision of the data, and therefore the quality of the investigation, depends on the instruments used.

BIO.9.2 Students will distinguish taxonomy as the systematic way in which organisms are placed into hierarchical classification system, according to their physical and genetic characteristics and their evolutionary history.

Students will…

BIO.9.2.1 identify that all organisms are classified into one of a number of kingdoms, the broadest taxonomic category.

BIO.9.2.2 verify that all organisms are classified into one of a number of kingdoms, the broadest taxonomic category.

BIO.9.2.3 demonstrate the use of dichotomous keys for different groups of organisms and organize them into taxonomic levels of classification.

BIO.9.3 Students demonstrate understanding of cellular organization within living things.

Students will…

BIO.9.3.1 ▲ verify cell functions involve specific chemical reactions. (HS.3.1.2)

Additional Specificity: Food molecules taken into cells provide the chemicals needed to synthesize other molecules.

BIO.9.3.2 ▲ deduce living organisms contain DNA or RNA as their genetic material, which provides the instructions that specify the characteristics of organisms.

Additional Specificity:

a. Nucleotides (adenine, thymine, guanine, cytosine and uracil) make up DNA and RNA molecules.
b. DNA and associated proteins supercoil during cellular replication to become structured as chromosomes.
c. Mitosis and meiosis are processes of nuclear division.

BIO.9.3.3 ▲ illustrate hereditary information is contained in genes, located in the chromosomes of each cell. (HS.3.2.3)

Additional Specificity:

a. An inherited trait of an individual can be determined by one gene or by many genes (a polygenic trait), and a single gene can influence more than one trait.
b. Alleles, which are different forms of a gene, may be dominant, recessive, or co-dominant.

BIO.9.4 Students will examine scientific application toward an understanding of evolution.

Students will…

BIO.9.4.1 ▲ relate that geological time is used to construct the earth's past. (HS.4.2.1)

Additional Specificity:

a. Radioactive dating and relative dating (i.e. stratigraphy, fossils) are used to estimate the time rocks were formed.
b. Relates geologic evidence to a record of Earth's history.
c. Matching coastlines, similarities in rock types, similarities in fossils and life forms suggest that today's continents are separated parts of what was long ago a single continent.

BIO.9.4.2 ▲ propose biological evolutions, descent with modification, is a scientific explanation for the history of the diversification of organism from common ancestors. (HS.3.3.1)

BIO.9.4.3 ▲ show biological evolution is used to explain the earth's present day biodiversity: the number, variety and variability of organisms. (HS.3.3.3)

Additional Specificity: Separate populations within a species may become sufficiently different enough that a new species develop. This process is called speciation.

BIO.9.4.4 ▲ verify that organisms vary widely within and between populations. Variation allows for natural selection to occur. (HS.3.3.4)

Additional Specificity:

a. Heritable variation exists in every species.
b. Variation of organisms within and among species increases the likelihood that some members will survive under changing environmental conditions.

Biology Trimester A ends with Trimester Exam and Lab Activities

BIO.9.5 Students will evaluate the chemistry of living things.

Students will…

BIO.9.5.1 ▲ analyze atoms and molecules on the earth cycle among the living and nonliving components of the biosphere. (HS.3.4.1)

Additional Specificity: The essential chemical elements for life circulate in the biosphere in characteristics paths known as biogeochemical cycles (e.g., cycles for water, nitrogen, carbon, oxygen, etc.)

BIO.9.5.2 ▲ distinguish that food molecules contain biochemical energy, which is then available for cellular respiration. (HS.3.5.3)

Additional Specificity:

a. Energy is transferred to ATP through cellular respiration.
b. Most biochemical reactions, fueled by ATP, are catalyzed by enzymes.

BIO.9.6 Students will compare ecosystems and populations of our planet.

Students will…

BIO.9.6.1 ▲ verify that the distribution and abundance of organisms and populations in ecosystems are limited by the carrying capacity. (HS.3.4.3)

Additional Specificity:

a. The carrying capacity is determined by the availability of matter and energy, and the ability of the ecosystem to recycle materials.
b. Living organisms produce more offspring that environmental resources can support, resulting in a competition for resources.

BIO.9.6.2 ▲ assess that the sun is the primary source of energy for the life through the process of photosynthesis. (HS.3.5.2)

Additional Specificity:

a. Plants and other photosynthetic organisms use energy to make organic compounds (primarily glucose) from carbon dioxide and water (CO_2 and H_2O) through a series of biochemical reactions.
b, The energy in these compounds is used to assemble large molecules with biological activity, including proteins, DNA, carbohydrates, and fats.

BIO.9.6.3 ▲ evaluate that animals have behavioral responses to internal changes and to extend stimuli. (HS.3.6.1)

BIO.9.6.4 ▲ relate that natural resources from the lithosphere and ecosystems are required to sustain human populations. (HS.6.3.1)

BIO.9.7 Students will analyze animal systems and their operations.
Students will…

BIO.9.7.1 ▲ justify that homeostasis is the dynamic regulation and balance of an organism's internal environment to maintain conditions suitable for survival.

Additional Specificity: Maintenance of internal conditions such as body temperature, blood sugars, oxygen/carbon dioxide ratios.

BIO.9.7.2 ▲ distinguish that living things change following a specific pattern of developmental stages called life cycles. (HS.3.7.3)

Additional Specificity: Various life cycles (i.e., metamorphosis of insects, amphibians and the reproductive life cycles of plants and fungal organisms).

BIO.9.7.3 verify that in complex organisms there is a division of labor into specific body systems (i.e., respiration, digestion, nervous, endocrine, excretion, circulatory, reproductive, immune, skeletal and muscular). (HS.3.7.4)

Additional Specificity:
a. These systems interact with one another to maintain homeostasis.
b. Relate the organs and their functions to the body systems.

BIO.9.8 Students will evaluate the history and nature of science.
Students will…

BIO.9.8.1 will develop an understanding that science is a human endeavor that uses models to describe and explain the physical universe. (HS.7.1)

BIO.9.8.2 relate the nature of scientific knowledge. (HS.7.2)

BIO.9.8.3 integrate science from historical perspectives. (HS.7.3)

Biology 2nd Trimester A ends with State Assessments, Final Exam, and Lab Activities