Course/Grade Level: Anatomy and Physiology Curriculum (12th Grade)

A&P.1 Students will develop, operate, evaluate, and analyze scientific investigations.

Students will…

A&P.1.1 ▲ actively engage 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 hypothesis, dependent and independent variables, analysis of data and the verification of support or rejection of the hypothesis

A&P.1.2 ▲ actively engage 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.

A&P.2 Students will demonstrate understanding of cellular organization within any living thing.

Students will…

A&P.2.1 ▲ appraise 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.

A&P.2.2 ▲ 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 super-coil during cellular replication to become structured as chromosomes.
c. Mitosis and meiosis in the development of nuclear division.

A&P.2.3 ▲ 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.

A&P.3 Students will examine scientific application toward an understanding of evolution within the human population.

Students will…

A&P.3.1 ▲ relate that geological time is used to construct the earth's past. (HS.4.2.1)

Additional Specificity:

a. Assess the relationship from modern man to our earliest form.
b. Relate geologic evidence to a record of human history.

A&P.3.2 ▲ 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)

Additional Specificity: Use descent with modification to explain the physiological changes which have occurred over time.

A&P.3.3 ▲ verify that organisms vary widely within and between populations. Variation allows for natural selection to occur. (HS.3.3.4)

A&P.4 Students will evaluate the chemistry of the human body.

Students will…

A&P.4.1 ▲ analyze atoms and molecules on the earth cycle among the living and nonliving components of the biosphere. (HS.3.4.1)

Additional Specificity:

a. The essential chemical elements for life circulate in the biosphere in characteristic paths known as biogeochemical cycles (e.g., cycles of water, nitrogen, carbon, oxygen, etc.).
b. These cycles occur within our bodies and are continually used and recycled within our system.

A&P.4.2 ▲ 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.
c. Using the digestive system students will differentiate parts of the system and how molecules will be transformed or developed.

A&P.5 Students will analyze animal systems and their operations.

Students will…

A&P.5.1 ▲ justify that homeostasis is the dynamic regulation and balance of an organism's internal environment to maintain conditions suitable for survival.

Additional Specificity:

a. Maintenance of internal conditions such as body temperature, blood sugars, oxygen/carbon dioxide ratios.
b. Integrate the various systems of the human body to evaluate each systems role in maintaining homeostasis.
c. Compare systems in how they may be integrated together and contrast how each system has a role which stands alone.

A&P.5.2 ▲ distinguish that living things change following a specific pattern of developmental stages called life cycles. (HS.3.7.3)

Additional Specificity:

a. Reproduction in gamete production with embryonic development.
b. The various roles of human development; infancy, childhood, adolescence, puberty, adult life maintenance, and aging which stands alone.

A&P.5.3 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 muscle. (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.
c. Dissect each system to illustrate the components of the system and how they function.

End of 1st Trimester Concluding with Trimester Exam and Lab Activities

A&P.5.4 differentiate the various parts of the integumentary system to analyze how each part protects and helps to maintain homeostasis. (HS.3.7.4)

Additional Specificity:

a. Depict the various parts of the dermis and epidermis and verify their role as a protective barrier and a regulator of homeostasis.
b. Critique the various structures within each layer and understand their function.
c. Relate the function of melanin as a protective factor for skin.
d. Understand the role of vasoconstriction and vasodialation as an influential factor in maintaining homeostasis.

A&P.5.5 evaluate the main types of muscle tissue in the muscular system and demonstrate how they support other systems in the human body. (HS.3.7.4)

Additional Specificity:

a. Depict the three types of muscle tissue; skeletal, cardiac, and smooth; and locate them within the various systems of the body.
b. Show the role of actin and myosin in a muscle contraction.
c. Relate muscle contraction to threshold stimulus and neurotransmitters as operational factors controlling muscle contractions.

A&P.5.6 locate the various bones within the skeletal system and evaluate the processes involved with the production, maintenance, and operation of each bone.

Additional Specificity:

a. Separate the axial and appendicular skeletons and identify the bones which make them up.
b. Discuss the process of bone formation through epiphyseal plates and the process of ossification.

A&P.5.7 evaluate the nervous system as the operational command center for the human body. (HS.3.7.4)

Additional Specificity:

a. Separate the system into the (CNS) central nervous system and (PNS) peripheral nervous system.
b. Dissect a neuron into its functional parts as to transmission of a nerve impulse.
c. Relate the various neurotransmitters in the operation of a nerve fiber.

A&P.5.8 assess the digestive systems responsibility for providing nutrient materials required to sustain cellular development, growth, and maintenance of all systems within the human body. (HS.3.7.4)

Additional Specificity:

a. Distinguish the various parts of the digestive system as to their location and function in breaking down molecular substances.
b. Relate the various enzymes involved with the reactions breaking down carbohydrates, lipids, and proteins.
c. Explain the role of circulation as providing a pathway for nutrients to be distributed throughout the body and elimination of cellular waste.
d. Discuss the monomers of food chemicals and their distributions and usage throughout the body.

A&P.5.9 evaluate the endocrine system as the body's chemical messenger, as hormones transfer information and instructions from one set of cells to another.

A&P.5.10 evaluate the various parts of the respiratory system and propose the functional properties of those parts. (HS.3.7.4)

A&P.5.11 compare the anatomy of male and female reproductive structures and evaluate the process of the production of gametes for the production of offspring.

Additional Specificity:

a. Apply meiosis and mitosis of nuclear division to evaluate the genetic possibilities of gametes.
b. Distinguish cell differentiation as the process by which the multitudes of different cells are produced from the zygote.
c. Evaluate the stages of embryonic development as cell differentiation occurs.

A&P.5.12 show the relationship of the parts of the cardiovascular system as it ties all systems in the human body together by providing a pathway for materials to be distributed throughout the body. (HS.3.7.4)

Additional Specificity:

a. Distinguish between the various types of circulation (e.g., pulmonary, coronary, renal, and hepatic portal).
b. Relate the vascular system including differences between arteries and veins and the conduction of blood throughout the body.
c. Analyze the parts of blood and the functions that each may have.

A&P.5.13 depict the parts of the urinary system and demonstrate how it is responsible for the elimination of nitrogenous waste compounds out of our system. (HS.3.7.4)

Additional Specificity:

a. Follow the flow-path of waste materials through the urinary system depicting which organs are responsible for filtering and elimination of nitrogenous waste materials.
b. Analyze the differences and similarities between the male and female organs of excretion as you follow the flow-path through the system.

A&P.6 Students will evaluate the history and nature of science.
Students will…

A&P.6.1 develop an understanding that science is a human endeavor that uses models to describe and explain the physical universe. (HS.7.1)

A&P.6.2 relate the nature of scientific knowledge. (HS.7.2)

A&P.6.3 integrate science from historical perspectives. (HS.7.3)

End of 2nd Trimester Concluding with Exam and Lab Activities