**ANATOMY & PHYSIOLOGY 1**

COURSE OF STUDY

I. **Academic Content Standard**

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| **Life Science** Students demonstrate an understanding of how living systems function and how they interact with the physical environment. This includes an understanding of the cycling of matter and flow of energy in living systems. An understanding of the characteristics, structure and function of cells, organisms and living systems will be developed. Students will also develop a deeper understanding of the principles of heredity, biological evolution, and the diversity and interdependence of life. Students demonstrate an understanding of different historical perspectives, scientific approaches and emerging scientific issues. |

II. Benchmarks

A. Explain how processes at the cellular level affect the functions and characteristics of an organism.

1. Identify selected cell structures and explain their functions.

2. Identify and describe the main characteristics and functions of the four types of tissues.

3. Describe how the maintenance of a relatively stable internal environment is required for the continuation of life, and explain how stability is challenged by changing physical, chemical, and environmental conditions.

a. Explain the basic concept of homeostasis and how feedback mechanisms maintain homeostasis.

B. Explain how the molecular basis of life and the principles of genetics determine inheritance.

1. Explain that carbon-containing molecules can be used to assemble larger molecules with biological activity (including proteins, DNA, sugars, and fats).

2. Recognize that information stored in DNA provides instructions for assembling proteins used by cells that determine the characteristics of the organism.

3. Summarize the steps of cell division (mitosis) and protein synthesis (DNA replication, transcription, and translation).

C. Explain the interconnectedness of the components of a natural system.

1. Develop a functional understanding of the language of Anatomy & Physiology.

1. Describe and identify the main body planes, body cavities, anatomical regions, and anatomical terminology.

2. Explain why specialized cells / structures are useful to plants and animals (e.g., stoma, phloem, xylem, blood, nerve, muscle, egg, and sperm).

a. Identify and describe the major macroscopic and microscopic anatomical components of human body systems.

1. INTEGUMENTARY SYSTEM

* Describe the structure and explain the functions of the three layers of the skin.
* Describe and explain the functions of the accessory structures within the skin.
* Explain the structures within the skin that produce the sense of touch.

1. SKELETAL SYSTEM

* Describe the structure and explain the functions of the skeletal system.
* Describe the various forms of bone and how the form relates to specific functions.
* Describe the composition of bone and identify common bone features.
* Explain the two divisions of the skeletal system and describe the components of each.
* Identify the main bones and distinguishing features of each division of the skeleton.
* Describe the four types of skeletal joints and identify locations of each within the body.

1. MUSCULAR SYSTEM

* Describe the structure and explain the functions of the muscular system.
* Identify and compare the three types of muscle tissue, and describe their characteristics and common locations.
* Describe the external and internal anatomy of a muscle, from whole muscle to myofibers.
* Identify the structures related to the neuromuscular junction.
* Describe the classification characteristics of muscles (e.g., fiber directions, origins / insertions, movements, shapes).
* Identify major superficial muscles of the body and the movements related with each.

1. NERVOUS SYSTEM

* Describe the structure and explain the functions of the nervous system.
* Compare & contrast structures and functions of the PNS and CNS.
* Describe the structural and functional classifications of neurons.
* Identify and describe the functions of the components within a neuron.
* Identify the structures related to the neuronal junction.
* Describe the composition of a reflex arc and identify the main structures.
* Describe the external and internal anatomy of the brain. Identify the main structures and provide their functions.
* Identify the structures and composition of the spinal cord and peripheral nerves.

1. BLOOD & CARDIOVASCULAR SYSTEM

* Describe the composition of whole blood.
* Identify the various cells and formed elements in blood and provide the function and characteristics of each.
* Describe the structure and explain the functions of cardiovascular system.
* Identify the external and internal structures of the heart and provide the function of each.
* Trace the pathway of blood as it circulates through the heart.
* Compare and contrast the structure and function of arteries, veins, and capillaries.
* Identify the major arteries and veins of the human body and the regions supplied / drained by each.

1. RESPIRATORY SYSTEM

* Identify and briefly describe the main organs of the respiratory system.

1. DIGESTIVE SYSTEM

* Identify and briefly describe the main organs of the digestive system.

1. URINARY SYSTEM

* Identify and briefly describe the main organs of the urinary system.

1. REPRODUCTIVE SYSTEM

* Identify and briefly describe the main organs of the reproductive system.

3. Relate diversity and adaptation to structures and functions of living organisms at different levels of organization.

a. Identify and describe the major macroscopic and microscopic physiological processes and interactions of human body systems.

1. INTEGUMENTARY SYSTEM

* Explain the functions of the various cell layers within the skin
* Describe the processes that create color within the skin and hair
* Describe common disorders / injuries of the skin

1. SKELETAL SYSTEM

* Describe the processes that create, repair, and remodel bone.
* Describe common disorders / injuries of bones, joints, and the skeletal system.

1. MUSCULAR SYSTEM

* Describe the processes that occur at the neuromuscular junction to stimulate a muscle cell.
* Describe the processes that occur within a muscle cell to create a muscle contraction.
* Describe common disorders / injuries of the muscular system.

1. NERVOUS SYSTEM

* Describe the process that stimulates a neuron and creates an action potential.
* Describe the process that passes a nerve impulse from one neuron to the next.
* Identify how different regions of the brain function to receive and control specific regions of the body.
* Describe common disorders / injuries of the brain and nervous system.

1. BLOOD & CARDIOVASCULAR SYSTEM

* Describe the process of hematopoiesis.
* Explain the steps in the process of hemostasis.
* Identify the common human blood type groups and explain how blood types are created and what effect this has in medical situations.
* Describe the process of intrinsic stimulation used by the heart to create a contraction.
* Explain the concept of blood pressure.
* Describe the interaction of blood pressure, heart rate, and activity.
* Describe common disorders / injuries of the blood and circulatory system.

D. Summarize the historical development of scientific theories and ideas within the study of life sciences.

1. Describe advances in life sciences that have important, long-lasting effects on science and society (e.g., biotechnology).

I. **Academic Content Standard**

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| **Scientific Inquiry** Students develop scientific habits of mind as they use the processes of scientific inquiry to ask valid questions and to gather and analyze information. They understand how to develop hypotheses and make predictions. They are able to reflect on scientific practices as they develop plans of action to create and evaluate a variety of conclusions. Students are also able to demonstrate the ability to communicate their findings to others. |

II. Benchmarks

A. Make appropriate choices when designing and participating in scientific investigations by using cognitive and manipulative skills when collecting data and formulating conclusions from the data.

1. Design and carry out scientific inquiry (investigation), communicate and critique results.

2. Formulate testable hypotheses. Develop and explain the appropriate procedures, controls and variables in scientific experimentation.

3. Create and clarify the method, procedure, controls, and variables in complex scientific investigations.

4. Summarize data and construct a reasonable argument based on those data and other known information.

5. Apply appropriate safety precautions when designing and conducting scientific investigations (e.g., OSHA, MSDS, eyewash, goggle, ventilation).