**ANATOMY & PHYSIOLOGY 2**

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 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. RESPIRATORY SYSTEM

* Describe the structure and explain the functions of respiratory system.
* Identify and describe the functions of the main organs of the respiratory system.

1. DIGESTIVE SYSTEM

* Describe the structure and explain the functions of the digestive system.
* Describe the four layers of tissues that form the alimentary canal.
* Identify the main organs of the digestive system and provide their function.
* Provide the functions and locations of the accessory structures of the digestive system.

1. URINARY SYSTEM

* Describe the structure and explain the functions of the urinary system.
* Identify and describe the function of the main organs of the urinary system.
* Describe the structure of the nephron and identify its structures.

1. SPECIAL SENSES

* Describe the structure and explain the functions of special senses of the body.
* Identify and describe the function of the main and accessory structures of the eye.
* Trace the pathway of light as it passes through the eye to create an image.
* Identify and describe the function of the main structures associated with balance and coordination in the ear.
* Identify and describe the function of the main structures associated with hearing within the ear.
* Describe the location and functions of the chemoreceptors associated with the senses of smell and taste.

1. LYMPHATIC SYSTEM

* Describe the structure and explain the functions of the lymphatic system.
* Describe the composition of lymph, and the structure and function of lymph vessels nodes, and accessory lymphatic organs.
* List and describe the various forms of white blood cells.

1. INTEGUMENTARY SYSTEM

* Identify and briefly describe the main structures of the skin.

1. SKELETAL SYSTEM

* Identify the main bones and distinguishing features of each division of the skeleton.

1. MUSCULAR SYSTEM

* Identify major superficial muscles of the body and the movements related with each.

1. NERVOUS SYSTEM

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

1. BLOOD & CARDIOVASCULAR SYSTEM

* Identify and briefly describe the main organs of the cardiovascular system.
* Identify the external and internal structures of the heart.
* Identify the major arteries and veins of the human body and the regions supplied / drained by each.

1. ENDOCRINE SYSTEM

* Describe the structure and explain the functions of the endocrine system.
* Identify and describe the function of major endocrine glands.

1. REPRODUCTIVE SYSTEM

* Describe the structure and explain the functions of reproductive system.
* Identify the structures of the male & female reproductive system, provide the function of each, and compare / contrast the two systems.
* Describe the structures associated with pregnancy and how each functions during pregnancy and delivery.

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. RESPIRATORY SYSTEM

* Describe the processes involved in both external and internal gas exchange.
* Explain how pressure differences inside and outside the chest allow for respiration to occur.
* Identify the various respiratory volumes and describe what each represents.
* Describe common disorders / injuries of the respiratory system.

1. DIGESTIVE SYSTEM

* Describe the mechanisms that move food through the alimentary canal.
* Identify the physical and chemical digestive processes that occur at each major organ along the alimentary canal.
* Describe how nutrients and water are absorbed from the digestive tract.
* Describe common disorders / injuries of the digestive system.

1. URINARY SYSTEM

* Describe the processes of filtration, reabsorption, and secretion that occur in the nephron during urine formation.
* Explain how the urinary system provides regulation of blood volume, electrolyte balance, and water within the body.
* Describe common disorders / injuries of the urinary system.

1. SPECIAL SENSES

* Describe how light interacts with receptors in the retina to produce an image.
* Explain how the lens of the eye is altered to focus light on the retina.
* Discuss the main reflexive actions of the eye.
* Explain how the inner ear interprets motion to maintain both static and dynamic equilibrium.
* Describe the processes involved in transmitting a sound wave through the ear and converting it into a nerve impulse within the ear.
* Explain how chemical reactions are involved in creating sensations of smell and taste.
* Identify the four taste sensations, and describe the chemical factors related to each.
* Describe common disorders / injuries of the special sense systems.

1. LYMPHATIC SYSTEM

* Describe the process of filtration that occurs within the lymphatic system.
* Compare / Contrast specific vs. nonspecific body defense mechanisms and provide example of how each works to prevent infection.
* Describe how the immune system recognizes foreign material and initiates an immune response.
* Explain the role of antigens and antibodies in the immune system, and how they contribute to immediate and long term immunity.
* Describe common disorders / injuries of the lymphatic system.

1. ENDOCRINE SYSTEM

* Explain what hormones are and how they affect the body.
* Describe the processes that regulate the production, secretion, and regulation of the endocrine system and how this system oversees the regulation of other systems in the body.
* List major endocrine hormones and describe their functions within the body.
* Describe common disorders / injuries of the endocrine system.

1. REPRODUCTIVE SYSTEM

* Describe the process spermatogenesis in the male, and oogenesis in female.
* Explain the hormonal changes and regulation of the female menstrual cycle.
* Identify and describe the processes involved in fertilization, implantation, and development of a zygote through fetus.
* Describe the hormonal and physical regulation of labor and delivery.
* Describe common disorders / injuries of the reproductive 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).