

Oakwood City School District Human Anatomy & Physiology Science Standards

One goal of science education is to help students become scientifically literate citizens able to use science as a way of knowing about the natural and material world. All students should have sufficient understanding of scientific knowledge and scientific processes to enable them to distinguish what is science from what is not science and to make informed decisions about career choices, health maintenance, quality of life, community and other decisions that impact both themselves and others.

Human Anatomy and Physiology is a high school level course, which satisfies the Ohio Core science graduation requirements of Ohio Revised Code Section 3313.603. This section of Ohio law requires three units of science. Each course should include inquiry-based laboratory experience that engages students in asking valid scientific questions and gathering and analyzing information.

Human Anatomy and Physiology comprises a systematic study in which students will examine human anatomy and physical functions. They will analyze descriptive results of abnormal physiology and evaluate clinical consequences. A workable knowledge of medical terminology will be demonstrated.

Human Anatomy & Physiology Standards

Levels of Organization

- A. Hierarchy of Organization
 - a. Identify the levels of organization from cellular to organism.
 - b. Describe the function of the organ systems.
 - c. Recognize the hierarchy of cellular organization.
- B. Types of Tissues
 - a. Define a tissue and classify the tissues of the human body.
 - b. Describe the general features, functions and specific examples of all four types of tissues.
 - c. Describe the general features, functions and specific examples of three select types of membranes.
- C. Homeostasis
 - a. Identify examples of how the body uses homeostasis to maintain balance.
 - b. Differentiate between positive and negative feedback mechanisms.
- D. Anatomical Terminology
 - a. Define and label a diagram of a human body with directional terms, planes and cavities.

Support and Motion

- A. Integumentary System
 - a. Use microscopes, micrographs, models or illustrations to identify types of skin cells and accessory structures.
 - b. Describe the process of tissue engineering and tissue donation.
 - c. Describe what attributes need to be considered in order to be a tissue donor.
 - d. List sensory structures in the integumentary system.
 - e. Explain the cause of homeostatic imbalances.
 - f. Explain how UV light exposure increases the risks of skin cancer.
- B. Skeletal System
 - a. Create an illustration of a long bone and label all structures.

- b. Use models or illustrations to identify and name bones and important bony features of the human skeleton.
 - c. Identify, label and describe the types of bones using graphics, images, Xray images or lab bone specimens.
 - d. Create an illustration of different stages of bone development and destruction, including fracture repair.
 - e. Examine factors that affect bone density.
 - f. Describe the movements of specified joints.
- C. Muscular System
- a. Describe the physiology of muscle fatigue.
 - b. Use microscopes, micrographs, models or illustrations to identify muscle tissue types.
 - c. Identify common muscle disorders and give common symptoms and treatments.

Integration and Coordination

- A. Nervous System
- a. Identify the main structures and functions of the central nervous system and the peripheral nervous system.
 - b. Identify and explain the function of nervous tissue cells.
 - c. Identify and explain the function of the regions of the brain.
 - d. Identify and explain the function structure of a nerve.
 - e. Identify and explain the function and components of the spinal cord.
 - f. Analyze graphs of membrane potential vs. time; distinguish between depolarization, repolarization and hyperpolarization.
- B. Special Senses
- a. Sense of Sight
 - i. Identify and explain the function of eye structure.
 - ii. Analyze the process of light being converted to an image.
 - b. Senses of Hearing and Balance
 - i. Identify and explain the function of the inner, outer, and middle ear.
 - ii. Listen to different tones and identify patterns of hearing ability.
 - iii. Contrast sensorineural and conductive hearing pathways.
 - c. Senses of Taste and Smell
 - i. Identify and explain the function of the anatomical structures related to taste and smell.
- C. Endocrine System:

- a. Identify and explain the function of the main structures associated with the endocrine system.
- b. Examine the pathway hormones take through the body and their associated interaction with target cells/organs.
- c. Draw examples of negative and positive feedback loops.
- d. Predict the effect of changes in hormone levels on different body processes.

Transport

A. Blood

- a. Explain the function of blood and each of the components of whole blood.
- b. Identify the structure and function of red blood cells (erythrocytes).
- c. Describe the impact of hemostasis on a living organism.
- d. Explain the relationship between antigens, antibodies and blood type. (e.g., ABO/Rh)
- e. Explain the role of hemoglobin.

B. Cardiovascular System

- a. Describe the pathway of blood through the valves, chambers and major vessels of the heart.
- b. Describe the pathway of blood through the pulmonary and systemic circuits.
- c. Identify the functions of the cardiovascular system.
- d. Identify the cells and tissues of the cardiovascular system.
- e. Explain the relationship between heart rate, volume and cardiac output.
- f. Describe the features of an electrocardiogram (ECG/EKG) used to identify homeostatic imbalances.
- g. Match electrocardiogram (ECG/EKG) waves to events in the cardiac cycle.
- h. Identify how a homeostatic imbalance impacts the cardiovascular system.

C. Lymphatic and Immune Systems

- a. Explain how the immune system works.
- b. Identify the structure and function of white blood cells.
- c. Describe the uses of Enzyme-Linked Immunosorbent Assay (ELISA).
- d. Identify and describe the structures and functions of the lymphatic system.
- e. Demonstrate the circulation of lymph throughout the body.

- f. Describe the mechanisms of autoimmune responses.

Absorption and Excretion

A. Digestive System

- a. Trace food from the mouth to the anus and describe what happens in each region.
- b. Distinguish mechanical from chemical digestion.
- c. Describe the structure and function of accessory digestive organs.
- d. Explain the role of specific enzymes in the digestive process.
- e. Identify the regions of the stomach and their functions.
- f. Identify tissue and cell types of digestive and accessory organs.

B. Respiratory System

- a. Identify sections of the respiratory tree by histological slides/images.
- b. Explain how the structure in each portion of the respiratory tree supports its function.
- c. List the normal respiratory volumes.
- d. Explain what factors alter respiratory volumes.
- e. Examine the antagonistic muscle groups responsible for inspiration and expiration.

C. Urinary System

- a. Identify the organs of the urinary system.
- b. Describe the basic physiological processes accomplished by the nephron (filtration, reabsorption, secretion).
- c. Describe the process by which the body eliminates excess fluids.
- d. Describe the roles of osmosis and diffusion in the process of urine formation.
- e. Explain how molecules/hormones influence the body's hydration status.
- f. Identify the impacts of drinking too much water (i.e., hyperhydration).
- g. Describe the gross and histological structure of the urinary bladder.
- h. Relate the structure of the urinary bladder to its function.
- i. Explain the relationship between the renal system and other organ systems (e.g., vascular) and the impact of renal failure on those systems.

Reproduction

A. Reproductive System

- a. Identify the structure and function of the male reproductive system.
- b. Identify the structure and function of the female reproductive system.
- c. Explain the pathway of a gamete through each reproductive system.
- d. Compare the processes of oogenesis and spermatogenesis.