

# Anatomy and Physiology

## UNIT I: Introduction to Anatomy and Physiology

**Goal 1. The student will demonstrate an understanding of the anatomic and physiological basis of life and the ability to explain the interdependence of structure and function in biological systems.**

Objectives - The student will be able to:

- a. Define anatomy and physiology.
- b. Identify the different levels of structural organization that make up the human body, and explain their relationships.
- c. List the organ systems of the body and explain the major functions of each.
- d. List the survival needs of the body.
- e. Define homeostasis and explain its importance.
- f. Define negative and positive feedback systems and describe their roles in maintaining body homeostasis.
- g. Describe the anatomical position and use correct terminology to describe body directions, regions, and body planes or sections.
- h. Locate the major body cavities and list the major organs in each.
- i. Review atomic structure, biological molecules, and compounds and their functions.

## UNIT II: Cytology and Histology

**Goal 1. The students will demonstrate the ability to analyze the structure and function of animal cells in relation to the diagnosis of abnormalities and malignancies (cytology) and the formation of tissue (histology).**

Objectives - The student will be able to:

- a. Describe the structure and function of a typical animal cell.
- b. Explain the cell cycle and discuss cell aging and how it relates to cancer.
- c. Define tissue and list the four primary tissue types, their subdivisions, and functions
- d. Describe the process of tissue repair involved in the normal healing of a superficial wound.
- e. Identify three primary germ layers and indicate the primary tissue classes arising from each.

### **UNIT III: Integumentary System**

**Goal 1. The students will demonstrate the ability to analyze the structures and functions of the integumentary system and discuss related biomedical conditions and their impacts on individuals and society.**

Objectives - The student will be able to:

- a. Identify the structures of the integumentary system and describe the functions of each structure.
- b. Describe the factors that can contribute to skin color. Briefly describe how changes in skin color may be used as clinical signs of certain disease and trauma states.
- c. Explain how to determine the extent of a burn and discuss current treatment.
- d. Compare the structure and locations of sweat and oil
- e. Summarize the characteristics and warning signs of skin cancers.

### **UNIT IV: The Skeletal System**

**Goal 1. The students will demonstrate the ability to analyze the structures and functions of the skeletal system and discuss related biomedical conditions and their impacts on individuals and society.**

Objectives - The student will be able to:

- a. List and describe five important functions of bones.
- b. Describe the gross anatomy of a typical long bone and flat bone. Indicate the locations and functions of red and yellow marrow, articular cartilage, periosteum, and endosteum.
- c. Distinguish between compact and spongy bone.
- d. Describe bone histology.
- e. Describe the process of bone formation and growth
- f. Describe bone injuries and disorders
- g. Describe the changes in bone during the aging process.
- h. Identify major bones in the skull
- i. Identify the bones of the axial and appendicular skeletons.
- j. Define and classify joints.
- k. Identify the most common joint injuries and disorders.

### **UNIT V: The Muscular System**

**Goal 1. The students will demonstrate the ability to analyze the structures and functions of the muscular system and the conditions associated with muscle fatigue.**

Objectives - The student will be able to:

- a. Compare and contrast the basic types of functions of muscle.
- b. Explain how muscle fibers are stimulated to contract, and explain the sliding filament mechanism of skeletal muscle contraction
- c. Define muscle twitch and describe the events occurring during its three phases.

- d. Define oxygen debt and muscle fatigue, and predict possible causes of muscle fatigue.
- e. Explain the function of prime movers, antagonists, synergists, and fixators, and describe how each promotes normal muscular function.
- f. Identify the major human body muscles and state the origin, insertion, and action for each.

## **UNIT VI: The Nervous System**

**Goal 1. The students will demonstrate the ability to analyze the structures and functions of the nervous system and discuss related biomedical conditions and their impacts on individuals and society.**

Objectives - The student will be able to:

- a. List the basic functions of the central and peripheral nervous system.
- b. Differentiate between autonomic and somatic nervous systems, including a comparison and contrasting of parasympathetic and sympathetic division of autonomic nervous system.
- c. Describe the anatomical structure of a neuron and relate each.
- d. Classify the neurons as afferent, efferent, or as interneurons.
- e. Explain how action potentials are generated and propagated along neurons.
- f. Define and describe the structure and function of a synapse.
- g. Identify the regions of the adult brain and general function.
- h. Describe how meninges, cerebrospinal, and the blood-brain barrier protect the central nervous system.
- i. Describe the roles of sensory receptors and effectors.
- j. Describe the cause (if known) and major signs and symptoms of cerebrovascular accidents and Alzheimer's disease.

## **UNIT VII: The Digestive System**

**Goal 1. The students will demonstrate the ability to analyze the structures and functions of the digestive system and discuss its relationship to diet and metabolism.**

Objectives - The student will be able to:

- a. Describe the overall structure and function of the digestive system.
- b. Differentiate between organs of the alimentary canal and accessory digestive organs.
- c. Describe the location and function of the peritoneum and the peritoneal cavity.
- d. Explain the dental formula and differentiate between deciduous and permanent teeth.
- e. Describe the composition and functions of saliva.
- f. Explain the role of bile and pancreatic juice in digestion.
- g. List the major functions of the large intestine. Explain how constipation and diarrhea can occur.
- h. Describe the process of absorption of digested foodstuffs that occurs in the small intestine.
- i. Describe how variations in diet affect the digestive system and the body as a whole.

- j. List the six major nutrient categories. Note important dietary sources and the principal cellular used of each.
- k. Define metabolism, catabolism, and anabolism.
- l. Explain the important events and products of cellular respiration.
- m. List and describe several metabolic functions of the liver.
- n. Differentiate between LDLs and HDLs.

## **UNIT VIII: The Urinary System**

**Goal 1. The students will demonstrate the ability to analyze the structures and functions of the urinary system and the characteristics of urine.**

Objectives - The student will be able to:

- a. Identify the organs and discuss the functions of the urinary system.
- b. Identify the parts of the nephron responsible for filtration, reabsorption, and secretion, and describe the mechanisms underlying each of these functional processes
- c. Discuss the physical and chemical characteristics of urine.
- d. Identify the ureters, the urinary bladder, and the male and female urethra.

## **UNIT IX: The Reproductive System**

**Goal 1. The students will demonstrate the ability to analyze the structures and functions of the male and female reproductive systems and discuss related biomedical conditions and their impacts on individuals and society.**

Objectives - The student will be able to:

- a. Describe the function of the male and female reproductive systems.
- b. Discuss the sources and functions of semen.
- c. Describe the structure and function of the mammary glands. (optional).
- d. Describe the phases and regulation of the ovarian cycle. (optional).
- e. Describe the processes of fertilization, implantation and placenta formation. (optional).
- f. Discuss the major events of embryonic and fetal development
- g. Identify the infectious agents and modes of transmission and sexually transmitted diseases.

## **UNIT X: The Circulatory System**

**Goal 1. The students will demonstrate the ability to analyze the structures and functions of the circulatory system and discuss related biomedical conditions and their impacts on individuals and society.**

Objectives - The student will be able to:

- a. Identify the function and basic structures of the cardiovascular system.
- b. List the components and functions of blood and plasma.

- c. Describe ABO and Rh blood groups. Explain the basis of transfusion reactions. Explain the types of genetically inherited blood disorders, such as hemophilia
- d. Trace the pathway of blood through the heart, pulmonary systemic, and hepatic-portal circulation.
- e. Identify the heart valves and describe their location and function.
- f. Draw a diagram of a normal electrocardiogram tracing: name the individual waves and intervals, and indicate what each represents.
- g. Identify some abnormalities that can be detected on an EKG tracing. (optional)
- h. Describe normal heart sounds, and explain how heart murmurs differ from normal sounds.
- i. Define vasoconstriction and vasodilatation.
- j. Compare and contrast the structure and function of arteries (elastic and muscular), arterioles, capillaries, sinusoids, venules, veins, and sinuses.
- k. List and explain the factors that influence blood pressure and pulse.
- l. Define *hypotension*, *hypertension*, *varicose veins*, *atherosclerosis*, *arteriosclerosis*, *phlebitis*, and *aneurism*. Note both symptoms and consequences.
- m. Describe the structure and distribution of lymphatic vessels, and not their functions. (optional).

## UNIT XI: The Immune System

**Goal 1. The students will demonstrate the ability to analyze the structures and functions of the immune system and discuss related biomedical conditions and their impacts on individuals and society.**

Objectives - The student will be able to:

- a. Discuss the structure and function of the immune system and its components.
- b. Compare and contrast nonspecific and specific defenses against pathogen and antigen invasion.
- c. Discuss disorders of the immune system including AIDS, autoimmunity, and allergies.
- d. Explain the developmental aspect of the immune system. (optional).

## UNIT XII: The Respiratory System

**Goal 1. The students will demonstrate the ability to analyze the structures and functions of the respiratory system and discuss related biomedical conditions and their impacts on individuals and society.**

Objectives - The student will be able to:

- a. Describe the structure and function of the respiratory system.
- b. Describe the gross structure of the lungs.
- c. Describe several physical factors that influence pulmonary ventilation.
- d. Describe how oxygen and carbon dioxide are transported in the blood.
- e. Compare the causes and consequences of chronic bronchitis, emphysema, lung cancer.

## **UNIT XIII: The Endocrine System**

**Goal 1. The students will demonstrate the ability to analyze the structures and functions of the endocrine system and discuss related biomedical conditions and their impacts on individuals and society.**

Objectives - The student will be able to:

- a. List the major endocrine and exocrine glands and organs, and describe their locations in the body.
- b. Describe how hormones are classified chemically.
- c. Describe the two major mechanisms by which hormones bring about their effects on their target tissues and explain how hormone release is regulated, positive and negative feedback systems.