

## Outline of the major topics covered in Human Anatomy and Physiology

### **Introduction**

Time: Two weeks

Homework Assignments

Introduction to Anatomy and Physiology Internet Project

Test

- **An Overview of Anatomy and Physiology**
- Define anatomy and physiology.
- Explain how anatomy and physiology are related.
- **Levels of Structural Organization**
- Name the levels of structural organization that make up the human body and explain how they are related.
- Name the organ systems of the body and briefly state the major functions of each system.
- Classify by organ system all organs discussed.
- Identify the organs shown on a diagram or a dissectible torso.
- **Maintaining Life**
- List functions that humans must perform to maintain life.
- List the survival needs of the human body.
- **Homeostasis**
- Define homeostasis and explain its importance.
- Define negative feedback and describe its role in maintaining homeostasis and normal body function.
- **The Language of Anatomy**
- Describe the anatomical position verbally or demonstrate it.
- Use proper anatomical terminology to describe body directions, surfaces, and body planes.
- Locate the major body cavities and list the chief organs in each cavity.

### **Cells and Tissues**

Time: Two and a half weeks

Homework Assignments

Cells Internet Project

Tissues Internet Project

Test

- **Cells**
- Name the four elements that make up the bulk of living matter and list several trace elements.
- Define cell, organelle, and inclusion.
- Identify on a cell model or diagram the three major cell regions (nucleus, cytoplasm, and plasma membrane).
- List the structures of the nucleus and explain the function of chromatin and nucleoli.

- Identify on a cell model or describe the organelles and discuss the major function of each.
- Define selective permeability, diffusion (including dialysis and osmosis), active transport, passive transport, hypertonic, hypotonic, and isotonic.
- Describe the structure of the plasma membrane, and explain how the various transport processes account for the directional movements of specific substances across the plasma membrane.
- **Tissues**
- Name the four major tissue types and their chief subcategories.
- Explain how the four major tissue types differ structurally and functionally.
- Give the chief locations of the various tissue types in the body.
- Describe the process of tissue repair (wound healing).

## **Skeletal System**

Time: Two and a half weeks

Homework Assignments

Skeletal System Internet Project

Skeletal System Disorders Internet Project

Test

- **Bones: An Overview**
- Identify the subdivisions of the skeleton as axial or appendicular.
- List at least three functions of the skeletal system.
- Name the four main kinds of bones.
- Identify the major anatomical areas of a long bone.
- Explain the role of bone salts and the organic matrix in making bone both hard and flexible.
- Describe briefly the process of bone formation in the fetus and summarize the events of bone remodeling throughout life.
- Name and describe the various types of fractures.
- **Axial Skeleton**
- On a skull or diagram, identify and name the bones of the skull.
- Describe how the skull of a newborn infant (or fetus) differs from that of an adult, and explain the function of fontanels.
- Name the parts of a typical vertebra and explain in general how the cervical, thoracic, and lumbar vertebrae differ from one another.
- Discuss the importance of the intervertebral discs and spinal curvatures.
- Explain how the abnormal spinal curvatures (scoliosis, lordosis, and kyphosis) differ from one another.
- **Appendicular Skeleton**
- Identify on a skeleton or diagram the bones of the shoulder and pelvic girdles and their attached limbs.
- Describe important differences between a male and female pelvis.

- **Joints**
- Name the three major categories of joints and compare the amount of movement allowed by each.
- **Developmental Aspects of the Skeleton**
- Identify some of the causes of bone and joint problems throughout life.

## **Muscular System**

Time: Two and a half weeks

Homework Assignments

Muscular System Internet Project

Muscular System Disorders Internet Project

Test

- **Overview of Muscle Tissues**
- Describe similarities and differences in the structure and function of the three types of muscle tissue and indicate where they are found in the body.
- Define and explain the role of the following: endomysium, perimysium, epimysium, tendon, and aponeurosis.
- **Microscopic Anatomy of Skeletal Muscle**
- Define muscular system.
- Describe the microscopic structure of skeletal muscle
- Explain the role of actin- and myosin-containing myofilaments.
- **Skeletal Muscle Activity**
- Describe how an action potential is initiated in a muscle cell.
- Describe the events of muscle cell contraction.
- Define graded response, tetanus, isotonic and isometric contractions, and muscle tone as these terms apply to skeletal muscle.
- Describe three ways in which ATP is regenerated during muscle activity. Define oxygen debt and muscle fatigue and list possible causes of muscle fatigue.
- Describe the effects of aerobic and resistance exercise on skeletal muscles and other body organs.
- **Muscle Movements, Types, and Names**
- Define origin and insertion
- **Gross Anatomy of Skeletal Muscles**
- Name and locate the major muscles of the human body (on a torso model, muscle chart, or diagram) and state the action of each.
- **Developmental Aspects of the Muscular System**
- Explain the importance of a nerve supply and exercise in keeping muscles healthy.
- Describe the changes that occur in aging muscles.

END OF FIRST SEMESTER

## START OF THE SECOND SEMESTER

### **Nervous System**

Time: Two and a half weeks

Homework Assignments

Nervous System/Nerve Cell Internet Project

Nervous System Disorders Internet Project

Test

- **Organization of the Nervous System**
- List the general functions of the nervous system.
- Explain the structural and functional classifications of the nervous system.
- Define central nervous system and peripheral nervous system and list the major parts of each.
- **Nervous Tissue: Structure and Function**
- State the function of neurons and neuroglia.
- Describe the general structure of a neuron and name its important anatomical regions.
- Describe the composition of gray matter and white matter.
- List the two major functional properties of neurons.
- Classify neurons according to structure and function.
- List the types of general sensory receptors and describe their functions.
- Describe the events that lead to the generation of a nerve impulse and its conduction from one neuron to another.
- Define reflex arc and list its elements.
- **Central Nervous System**
- Identify and indicate the functions of the major regions of the cerebral hemispheres, diencephalon, brain stem, and cerebellum on a human brain model or diagram.
- Name the three meningeal layers and state their functions.
- Discuss the formation and function of cerebrospinal fluid and the blood-brain barrier.
- Compare the signs of a CVA with those of Alzheimer's disease; of a contusion with those of a concussion.
- List two important functions of the spinal cord.
- Describe spinal cord structure.
- **Peripheral Nervous System**
- Describe the general structure of a nerve.
- Identify the cranial nerves by number and by name, and list the major functions of each.
- Identify the site of origin and explain the function of the sympathetic and parasympathetic divisions of the autonomic nervous system.
- **Developmental Aspects of the Nervous System**
- List several factors that may have harmful effects on brain development.
- Briefly describe the cause, signs, and consequences of the following congenital disorders: spina bifida, anencephaly, cerebral palsy.
- Explain the decline in brain size and weight that occurs with age.

## **Cardiovascular System: The Heart and Blood**

Time: Two weeks and a half weeks

Homework Assignments

Cardiovascular Internet Project

Blood Vessels Internet Project

Test

- **The Heart**
- Describe the location of the heart in the body and identify its major anatomical areas on an appropriate model or diagram.
- Trace the pathway of blood through the heart.
- Compare the pulmonary and systemic circuits.
- Name the functional blood supply of the heart.
- Define systole, diastole, stroke volume, and cardiac cycle.
- Explain the operation of the heart valves.
- Define heart sounds and murmur.
- Name the elements of the intrinsic conduction system of the heart and describe the pathway of impulses through this system.
- **Blood Vessels**
- Compare and contrast the structure and function of arteries, veins, and capillaries.
- Identify the body's major arteries and veins and name the body region supplied by each.
- Discuss the unique features of special circulations of the body: arterial circulation of the brain, hepatic portal circulation, and fetal circulation.
- Define blood pressure and pulse and name several pulse points.
- List factors affecting and/or determining blood pressure.
- Describe the exchanges that occur across capillary walls.
- **Developmental Aspects of the Cardiovascular System**
- Describe briefly the development of the organs of the cardiovascular system.
- Explain how regular exercise and a diet low in fats and cholesterol may help maintain cardiovascular health.
- **Blood**
- Composition and Functions of Blood
- Describe the composition and volume of whole blood.
- Describe the composition of plasma and discuss its importance in the body.
- List the cell types making up the formed elements and describe the major functions of each type.
- **Hemostasis**
- Describe the blood-clotting process.
- Name some factors that may inhibit or enhance the blood-clotting process.
- **Blood Groups and Transfusions**
- Describe the ABO and Rh blood groups.
- Explain the basis for a transfusion reaction.
- **Developmental Aspects of Blood**
- Explain the basis of physiological jaundice seen in some newborn babies.

## **Digestive System**

Time: One and a half weeks

Homework Assignments

Digestive System Internet Project

Digestive System Disorders Internet Project

Test

- **Anatomy of the Digestive System**
- Name the organs of the alimentary canal and accessory digestive organs and identify each on an appropriate diagram or model.
- Identify the overall function of the digestive system as digestion and absorption of foodstuffs, and describe the general activities of each digestive system organ.
- Describe the composition and function(s) of saliva.
- Name the deciduous and permanent teeth and describe the basic anatomy of a tooth.
- Explain how villi aid digestive processes in the small intestine.
- **Functions of the Digestive System**
- Describe the mechanisms of swallowing, vomiting, and defecation.
- Describe how foodstuffs in the digestive tract are mixed and moved along the tract.
- Describe the function of local hormones in the digestive process.
- List the major enzymes or enzyme groups produced by the digestive organs or accessory glands and name the foodstuffs on which they act.
- Name the end products of protein, fat, and carbohydrate digestion.
- State the function of bile in the digestive process.
- **Nutrition and Metabolism**
- Define nutrient, essential nutrient, and calorie.
- Describe the metabolic roles of the liver.
- Recognize the sources of carbohydrates, fats, and proteins and their uses in cell metabolism.
- List several factors that influence metabolic rate, and indicate the effect of each.
- Describe how body temperature is regulated.
- **Developmental Aspects of the Digestive System and Metabolism**
- Name important congenital disorders of the digestive system and significant inborn errors of metabolism

## **Respiratory System**

Time: One and a half weeks

Homework Assignments

Respiratory System Internet Project

Respiratory System Disorders Internet Project

Test

- **Functional Anatomy of the Respiratory System**

- Name the organs forming the respiratory passageway from the nasal cavity to the alveoli of the lungs (or identify them on a diagram or model) and describe the function of each.
- Describe several protective mechanisms of the respiratory system.
- Describe the structure and function of the lungs and the pleural coverings.
- **Respiratory Physiology**
- Define: cellular respiration, external respiration, internal respiration, pulmonary ventilation, expiration, and inspiration.
- Explain how the respiratory muscles cause volume changes that lead to air flow into and out of the lungs (breathing).
- Define the following respiratory volumes: tidal volume, vital capacity, expiratory reserve volume, inspiratory reserve volume, and residual air.
- Describe several nonrespiratory air movements and explain how they modify or differ from normal respiratory air movements.
- Describe the process of gas exchanges in the lungs and tissues.
- Describe how oxygen and carbon dioxide are transported in the blood.
- Name the brain areas involved in control of respiration.
- Name several physical factors that influence respiratory rate.
- Explain the relative importance of the respiratory gases (oxygen and carbon dioxide) in modifying the rate and depth of breathing.
- Explain why it is not possible to stop breathing voluntarily.
- **Respiratory Disorders**
- Describe the symptoms and probable causes of COPD and lung cancer.
- **Developmental Aspects of the Respiratory System**
- Describe normal changes that occur in respiratory system functioning from infancy to old age.

## **Endocrine System**

Time: One and a half weeks

Homework Assignments

Endocrine System Internet Project

Test

- **The Endocrine System and Hormone Function - An Overview**
- Define hormone and target organ.
- Describe how hormones bring about their effects in the body.
- Explain how various endocrine glands are stimulated to release their hormonal products.
- Define negative feedback and describe its role in regulating blood levels of the various hormones.
- Describe the difference between endocrine and exocrine glands.
- **The Major Endocrine Organs**
- On an appropriate diagram, identify the major endocrine glands and tissues.
- List hormones produced by the endocrine glands and discuss their general functions.

- Discuss ways in which hormones promote body homeostasis by giving examples of hormonal actions.
- Describe the functional relationship between the hypothalamus and the pituitary gland.
- Describe major pathologic consequences of hypersecretion and hyposecretion of the hormones considered in this chapter.
- **Other Hormone-Producing Tissues and Organs**
- Indicate the endocrine role of the kidneys, the stomach and intestine, the heart, and the placenta.
- **Developmental Aspects of the Endocrine System**
- Describe the effect of aging on the endocrine system and body homeostasis.

Review for final

Final

END OF SECOND SEMESTER