

Fundamentals of Anatomy and Physiology

Course Syllabus

Course Description

Fundamentals of Anatomy & Physiology gives students in-depth instruction in the organization, structures, and functions of the human body. Students will learn the terminology, anatomy and physiology, and pathology of each body system and how they interrelate to maintain homeostasis.

Learning Outcomes

Upon successful completion of the readings, activities, and virtual lab contained in this online course, students will be able to:

1. Use correct terminology to discuss the chemistry, cell structure, and tissues of the human body.
2. Use correct terminology to discuss the components and functions of blood, as well as the formation and anatomy of blood cells.
3. Identify and explain the structure and functions of each body system.
4. Discuss diseases, disorders, and conditions commonly found in healthcare occupations.
5. Explain the role of each body system in maintaining homeostasis.
6. Describe the physiological effects of aging on the human body.

Course Outline and Objectives

Chapter 1: The Human Body

1. Define the anatomic terms used to refer to the body in terms of directions and geometric planes.
2. Describe the major cavities of the body and the organs they contain.
3. Explain what a cell is.
4. Describe the major functions of the four types of human tissue.
5. List the major systems of the body, the organs they contain and the functions of those systems.
6. Define the terms anatomy and physiology.
7. Define homeostasis.

Chapter 2: Chemistry of Life

1. Define the structure of an atom and its component subatomic particles.
2. List the major chemical elements found in living systems.
3. Compare the differences between ionic and covalent bonding and how molecules formed by either ionic or covalent bonds react in water.
4. Understand the basic chemical structure of water, carbon dioxide and oxygen gas, ammonia, the mineral salts, carbohydrates, lipids, proteins, the nucleic acids DNA and RNA, the chemical compound ATP and their role in living systems.
5. Explain the difference between diffusion, osmosis and active transport and their role in maintaining cellular structure and function.
6. Define *pH* and its significance in the human body.
7. Explain why water is so important to the body.
8. Define the terms *acid*, *base* and *salt*.
9. Explain how the numbers on the pH scale relate to acidity and alkalinity.

Chapter 3: Cell Structure

1. Name the major contributors to the cell theory.
2. Explain the molecular structure of a cell membrane.
3. Describe the structure and function of cellular organelles.
4. Explain the significance and process of protein synthesis.

Chapter 4: Cellular Metabolism

1. Define metabolism.
2. Describe the basic steps in glycolysis and indicate the major products and ATP production.
3. Describe the Krebs citric acid cycle and its major products and ATP production.
4. Describe the electron transport system and how ATP is produced.
5. Compare glycolysis with anaerobic production of ATP in muscle cells and fermentation.
6. Explain how other food compounds besides glucose are used as energy sources.
7. Name the discoverers of the anatomy of the DNA molecule.
8. Know the basic structure of the DNA molecule.
9. Name the nitrogen base pairs and how they pair up in the DNA molecule.
10. Define the stages of the cell cycle.
11. Explain the significance of mitosis in the survival of the cell and growth in the human body.
12. Understand the significance of meiosis as a reduction of the genetic material and for the formation of the sex cells.

Chapter 5: Tissues

1. Classify epithelial tissue based on shape and arrangement and give examples.
2. Name the types of glands in the body and give examples.
3. Name the functions of connective tissue.
4. Compare epithelial tissue with connective tissue in terms of cell arrangement and interstitial materials.
5. Name the three major types of connective tissue and give examples.
6. List the functions of epithelial tissue.
7. List the three types of muscle and describe each based on structure and function.
8. Describe the anatomy of a neuron and the function of nervous tissue.

Chapter 6: The Integumentary System

1. Name the layers of the epidermis.
2. Define keratinization.
3. Explain why there are skin color differences among people.
4. Describe the anatomic parts of a hair.
5. Compare the two kinds of glands in the skin based on structure and secretion.
6. Explain why sweating is important to survival.
7. Explain how the skin helps regulate body temperature.
8. Name the functions of the skin.

Chapter 7: Skeletal System

1. Name the functions of the skeletal system.
2. Name the two types of ossification.
3. Describe why diet can affect bone development in children and bone maintenance in older adults.

4. Describe the histology of compact bone.
5. Define and give examples of bone markings.
6. Name the cranial and facial bones.
7. Name the bones of the axial and appendicular skeleton.

Chapter 8: Articular System

1. Name and describe the three types of joints.
2. Name examples of the two types of synarthroses joints.
3. Name examples of the two types of amphiarthroses joints.
4. Describe and give examples of the six types of diarthrosis or synovial joints.
5. Describe the capsular nature of a synovial joint.
6. Describe the three types of bursae.
7. Name some of the disorders of joints.
8. Describe the possible movements at synovial joints.

Chapter 9: Muscular System

1. Describe the gross and microscopic anatomy of skeletal muscle.
2. Describe and compare the basic differences between the anatomy of skeletal, smooth and cardiac muscles.
3. Explain the current concept of muscle contraction based on three factors: neuroelectrical, chemical and energy sources.
4. Define muscle tone and compare isotonic and isometric contractions.
5. List factors that can cause muscles to malfunction, causing various disorders.
6. Name and identify the location of major superficial muscles of the body.

Chapter 10: Nervous System I

1. Name the major subdivisions of the nervous system.
2. Classify the different types of neuroglial cells.
3. List the structural and functional classification of neurons.
4. Explain how a neuron transmits a nerve impulse.
5. Name the different types of neural tissues and their definitions.
6. Describe the structure of the spinal cord.
7. Name and number the spinal nerves.

Chapter 11: The Nervous System II

1. List the principal parts of the brain.
2. Name the functions of the cerebrospinal fluid.
3. List the principal functions of the major parts of the brain.
4. List the 12 cranial nerves and their functions.
5. Name the parts of the autonomic nervous system and describe how it functions.
6. Describe the basic anatomy of the sense organs and explain how they function.

Chapter 12: The Endocrine System

1. List the functions of hormones.
2. Classify hormones into their major chemical categories.
3. Describe how the hypothalamus of the brain controls the endocrine system.
4. Name the endocrine glands and state where they are located.
5. List the major hormones and their effects on the body.

Chapter 13: The Blood

1. Describe the functions of blood.
2. Classify the different types of blood cells.
3. Describe the anatomy of erythrocytes relative to their function.
4. Compare the functions of the different leukocytes.
5. Explain how and where blood cells are formed.
6. Explain the clotting mechanism.
7. Name the different blood groups.

Chapter 14: Cardiovascular System

1. Describe how the heart is positioned in the thoracic cavity.
2. List and describe the layers of the heart wall.
3. Name the chambers of the heart and their valves.
4. Name the major vessels that enter and exit the heart.
5. Describe blood flow through the heart.
6. Explain how the conduction system of the heart controls proper blood flow.
7. Describe the stages of a cardiac cycle.
8. Compare the anatomy of a vein, artery and capillary.
9. Name the major blood circulatory routes.

Chapter 15: The Lymphatic System

1. Name the functions of the lymphatic system.
2. Explain what lymph is and how it forms.
3. Describe lymph flow through the body.
4. Name the principal lymphatic trunks.
5. Describe the functions of the tonsils and spleen.
6. Explain the unique role the thymus gland plays as part of the lymphatic system.
7. Describe the different types of immunity.
8. Explain the difference between blood and lymphatic capillaries.
9. Explain the difference between active immunity and passive immunity.
10. Define an antigen and an antibody.

Chapter 16: Nutrition and the Digestive System

1. List and describe the five basic activities of the digestive process.
2. List the four layers or tunics of the walls of the digestive tract.
3. Name the major and accessory organs of the digestive tract and their component anatomic parts.
4. Explain the major digestive enzymes and how they function.
5. Explain the functions of the liver.
6. Explain how absorption of nutrients occurs in the small intestine and how feces form in the large intestine.
7. Name and describe the functions of the organs of the digestive tract.

Chapter 17: The Respiratory System

1. Explain the function of the respiratory system.
2. Name the organs of the system.
3. Define the parts of the internal nose and their functions.
4. Name the three areas of the pharynx and explain their anatomy.
5. Name the cartilages and membranes of the larynx and how they function.

6. Explain how the anatomy of the trachea prevents collapse during breathing and allows for esophageal expansion during swallowing.
7. Explain what is meant by the term *bronchial tree*.
8. Describe the structure and function of the lungs and pleura.
9. Describe the overall process of gas exchange in the lungs and tissues.
10. Define *ventilation*, *external respiration* and *internal respiration*.

Chapter 18: The Urinary System

1. Define the function of the urinary system.
2. Name the external layers of the kidney.
3. Define the following internal parts of the kidneys: cortex, medulla, medullary pyramids, renal papillae, renal columns and major and minor calyces.
4. Name the parts of a nephron and describe the flow of urine through this renal tubule.
5. List the functions of the nephrons.
6. Explain how urine flows down the ureters.
7. Describe micturition and the role of stretch receptors in the bladder.
8. Compare the length and course of the male urethra to the female urethra.
9. Name the normal constituents of urine.

Chapter 19: The Reproductive System

1. Name the internal parts of a testis.
2. Explain the effects of testosterone on the male body.
3. Describe the process of spermatogenesis.
4. Follow the path of a sperm from the seminiferous tubules to the outside.
5. Define semen and what glands contribute to its composition.
6. Name the three parts of the male urethra.
7. Describe the development of a follicle, before and after ovulation.
8. Describe the process of oogenesis.
9. Name the parts of the uterus.
10. Name the external genitalia of the female.
11. Describe the phases of the menstrual cycle.
12. Describe lactation and the function of the mammary glands.
13. Name the phases of labor.

Completion and Accreditation

Students who pass the chapter tests with an overall average of 70% or higher will receive a certificate of completion and 9.5 Continuing Education Units (CEUs). One CEU is equivalent to 10 hours of class time.

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