



South Central College

BIOL 225 Anatomy and Physiology I

Course Outcome Summary

Course Information

Description	Anatomy and Physiology I is an introduction to the structure and function of the human body under normal and abnormal conditions. It is the first in a two course series. It will cover tissues, the integumentary, skeletal, and muscular systems, articulations, nervous tissue, spinal cord and nerves, brain and cranial nerves, anatomy of the heart, blood vessels and circulation and the lymphatic structures. It will also cover cellular biology, cellular transport, cell respiration, cell reproduction and basic review of biochemistry as it relates to the human body. This course contains a laboratory component which includes dissection. For Biology majors, please see BIOL 220 Anatomy and BIOL 230 Physiology. (MNTC area 3) (Prerequisite: CHEM 108 or CHEM 110, and a Reading Comprehension Score of 78 or above or completion of READ0090 with a C or higher.)
Total Credits	4
Total Hours	80

Types of Instruction

Instruction Type	Credits/Hours
Lecture	3
Laboratory	1

Pre/Corequisites

CHEM 108 or CHEM 110

Reading Comprehension Score of 78 or above or completion of READ0090 with a C or higher

Institutional Core Competencies

Critical and Creative Thinking - Students will be able to demonstrate purposeful thinking with the goal of using a creative process for developing and building upon ideas and/or the goal of using a critical process for the analyzing and evaluating of ideas.

Course Competencies

- Demonstrate anatomical language and distinguish the levels of organization in organisms.**

Learning Objectives

Identify the major levels of structural organization from chemical to organ systems and their interactions.

Identify the 11 organ systems and understand their major functions.
Describe and demonstrate directional terms to identify body regions, relative positions, and the anatomical position.
Identify and understand the functions of the major body cavities and their membranes.

2. Explain the relationship between chemistry and the physiology of organisms.

Learning Objectives

Understand the crucial role of enzymes in metabolism.
Describe the importance of pH and the role of buffers in body fluids.
Explain the physiological role of water and inorganic compounds.
Describe the structures and functions of carbohydrates, lipids, proteins, nucleic acids and high-energy compounds.

3. Identify and describe the major regions of a cell and subcellular organelles and their functions.

Learning Objectives

Describe the structural features and functions of the plasma membrane.
Describe the structure and functions of the organelles of a typical eukaryotic cell.
Summarize the role of DNA in protein synthesis, cell structure and cell function.
Describe cellular diffusion, osmosis, carrier-mediated transport and vesicular transport mechanisms, and explain their roles in physiological systems.
Describe the importance of the transmembrane potential.
Describe the events in the cell cycle.
Define and explain the importance of differentiation.

4. Describe the structural and functional relationships between cells and tissues and classify the four major categories of tissues.

Learning Objectives

Describe epithelial tissue type according to function, characteristics, classification and naming.
Compare and contrast exocrine and endocrine gland secretion.
Compare the structure and functions of the various types of connective tissues.
Specify the functions of the 4 types of membranes formed from epithelial and connective tissue.
Compare and contrast skeletal muscle, smooth muscle and cardiac muscle.
Discuss the basic structure and function of neural tissue.
Describe how injuries affect the tissues of the body.

5. Identify and describe the major features and functions of the integumentary system.

Learning Objectives

Compare and contrast the epidermis, dermis and subcutaneous (hypodermous) layers and the importance of each.
Explain the factors that contribute to individual and racial differences in skin color.
Describe the production of vitamin D.
Describe the roles of epidermal growth factor.
Discuss the anatomy and functions of the skin's accessory structures: hair, glands and nails.
Describe how the skin responds to injury and repairs itself.
Describe and identify the causes of basal cell carcinoma, squamous cell carcinomas and malignant melanomas.
Compare and contrast first, second and third degree burns.
Identify the various structures of the skin on laboratory models.

6. Describe the gross and microscopic structure of bone tissue and identify the bones and major markings of the body.

Learning Objectives

Describe the primary functions of the skeletal system.
Describe the types of cells found in bone and compare their functions: osteoblasts, osteocytes, osteoprogenitor cells and osteoclasts.
Describe the gross structure of a long bone, distinguishing between compact and spongy bone.
Describe the microscopic structure and chemical composition of bone tissue.
Describe the process of bone growth in thickness and in length.
Describe the effects of nutrition, hormones, exercise and aging on bone development and the skeletal system.
Describe the process of how fractures heal.

Characterize various clinical cases including: kyphosis, scoliosis, lordosis, herniated disc, hip replacement and knee replacement.

Describe the structural features that distinguish the male from the female pelvis.

Identify various skull bone dysfunctions including cleft palate, cleft lip and deviated septum and spina bifida.

Identify the axial skeleton bones, specific bone markings and their significance.

Locate the appendicular skeleton bones, specific bone markings and describe their significance.

7. Distinguish among the different types of articulations and describe their functions.

Learning Objectives

Describe and identify examples of the types of joints according to structure: bony, fibrous, cartilaginous and synovial.

Describe the basic structure of a synovial joint, and describe accessory structures and their functions.

Describe the knee in depth as a representative synovial joint.

Characterize common knee and shoulder injuries.

Identify the key structures of the knee on laboratory models.

8. Describe the gross and microscopic structure of a skeletal muscle and identify the major muscles of the body.

Learning Objectives

Specify the functions of skeletal muscle tissue.

Discuss the organization of muscle at the tissue level.

Describe the arrangement and function of the sarcoplasmic reticulum, transverse tubules, myofibrils and myofilament, thick and thin filaments and sarcomere organization within skeletal muscle fibers.

Characterize the components of the neuromuscular junction and summarize events that occur at the junction.

Summarize the steps of muscular contraction using the Sliding Filament Theory.

Describe the mechanism by which muscle fibers obtain energy to power contractions.

Relate the types of muscle fibers to muscle performance.

Identify the structural and functional differences between skeletal, smooth and cardiac muscle cells.

Explain recruitment and summation, and how it increases the force of contraction.

Explain the length tension relationship and how it affects the force of contraction.

Compare and contrast the functions and structure of skeletal, smooth and cardiac muscle.

Characterize various dysfunctions including rigor mortis, muscle soreness, hernia, compartment syndrome and tetanus.

Use the name of the muscle to help identify and remember its location.

Identify major muscles of the axial and appendicular divisions on laboratory models.

Identify the major components of a muscle cell and the neuromuscular junction on a muscle cell model.

Dissect and identify various cat muscles that are analogous to humans.

9. Identify the structures and functions of neural tissue.

Learning Objectives

Compare and contrast the anatomical subdivisions of the nervous system based on structure and function.

Describe the structures and functions of a typical neuron.

Classify neurons on the basis of their structure and function.

Compare and contrast the functions and location of the neuroglia in the CNS and PNS.

Explain how the resting potential is created and maintained.

List and describe the stages of an action potential.

Discuss the factors that affect the speed of action potentials.

Explain absolute and relative refractory and the importance of each.

Summarize the events that occur during synaptic transmission and describe the effects of a typical neurotransmitter, ACh.

Describe the major types of neurotransmitter and their effects on postsynaptic membranes.

Discuss the interactions that enable information processing to occur in neural tissue.

Identify the components of a neuron on a laboratory model.

10. Discuss the structure and functions of the spinal cord and spinal nerves.

Learning Objectives

Describe the basic structural and organizational characteristics of the nervous system.

Describe the location and structure of the spinal cord, the arrangement of white and gray matter and the spinal meninges.

Describe the location, origin and termination of the major ascending and descending spinal tracts.
Describe the overall organization and general functions of the peripheral nervous system (PNS).
Identify the spinal nerves, the segments of the spinal cord with which they are associated and the body structures they innervate.
Explain how dermatomes are related to the sensory innervation regions of the spinal nerves.
Describe the steps in a neural reflex and classify the types of reflexes.
Identify the structures of the spinal cord (including meninges) and major nerves on a laboratory model.
Dissect and identify a few major nerves in a cat.

11. Identify and describe the functions of the major regions of the brain and cranial nerves.

Learning Objectives

Describe the locations and functions of the major brain regions and ventricles.
Discuss the formation, circulation and function of cerebrospinal fluid.
List the main components and functions of the medulla oblongata, pons, mesencephalon, diencephalon and cerebellum.
Identify the main components, locations and functions of the limbic system.
Identify the 12 pairs of cranial nerves and their functions.

12. Describe the anatomy and flow of blood through the heart.

Learning Objectives

Define and distinguish between pulmonary circuit and systemic circuit.
Distinguish between the pericardial sac, parietal pericardium and visceral pericardium.
Identify and describe the epicardium, myocardium and endocardium of the heart.
Trace a drop of blood through the heart; incorporate pulmonary and systemic systems.
Describe the structural and functional characteristics of each chamber of the heart and the heart valves.
Describe the characteristics of cardiac muscle tissue.
Identify the structures of the heart on laboratory models.

13. Describe the blood vessels and circulation.

Learning Objectives

Explain the direction of blood flow and state of oxygenation.
Describe how and where fluid and dissolved materials enter and leave the cardiovascular system.
Describe the principal blood vessels and functional characteristics of the special circulation to the brain, heart and lungs.
Describe the 3 general functional patterns seen in the pulmonary and systemic circuits of the cardiovascular system.
Identify the major differences between fetal and adult circulation.
Identify the major arteries and veins of the systemic circuit in a cat and on anatomical models.

14. Describe the anatomy of the lymphatic vessels.

Learning Objectives

Describe the functions of the lymphatic system.
Describe the structure and functions of the various lymphatic vessels and their relationship to the venous system.
Trace the flow of lymph from capillaries to the heart.
Describe the location, structure and function of the principal lymphoid tissues including MALT, tonsils, nodes, thymus and spleen.
Identify the structures of the lymphatic system on anatomical models.

15. Adhere to safety rules in the laboratory.

Learning Objectives

Locate safety equipment and describe its proper use.
Understand the hazards associated with working with preserved specimens in the lab.
Follow safety procedures and chemical hygiene practices as outlined in the lab.

16. Explain cellular respiration.

Learning Objectives

Describe glycolysis, Krebs cycle and oxidative phosphorylation.
Understand the role of oxygen in ATP production.
Explain where carbon dioxide is produced during cellular respiration.

Differentiate between the end products produced in aerobic versus anaerobic conditions.

SCC Accessibility Statement

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Additional information and forms can be found at: www.southcentral.edu/disability

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