Course Information Form (CIF)

Course Code: BIO 121

Course Title: Anatomy and Physiology I

Department: Natural Sciences
PCS Code: 1.1 - Baccalaureate/Transfer
CIP Code: 26.0403
Repeatability: 0

Effective Date: Summer 2026

Credit Hours

Catalog Notation: 3-3-4
Credit Hour Distribution:

Lecture: 3	Lab: 3	Clinical: 0	**Total: 4**

General Course Information

Catalog Description

Structure and function of human body. Introduction to anatomy and physiology; chemistry review, cytology, histology, integument, skeletal system, articulations, muscular, and nervous systems. Uses anatomical models, human cadavers, and the Anatomage digital dissection table.

General Course Objectives

- Provide a challenging intellectual environment that prepares students for health career programs and/or transfer to four-year institutions.
- Develop students' abilities to correctly identify anatomical structures, explain physiological processes, and communicate using discipline-specific (anatomical and medical) terminology.
- Students will develop an understanding of functional anatomy and physiology as it pertains to normal body function, enabling them to better participate in making both personal and societal health care decisions.

Minimum Placement Levels

English	Reading	Math
Placement out of ENG 099	Placement out of CCS 098	None

Prerequisites

Credit in high school or college level chemistry within the last three years with a grade of C or higher, or pass the Chemistry Competency Exam.

Methods of Evaluation

11 unit quizzes, 2 written hour exams, 14 pre-lab assignments, 9-12 lab reports, 3 lab exams, 7-9 collaborative activities, 10-11 homework assignments, 4 lab practical exams, and a cumulative final exam.

Instructional Materials and Additional Supplies

Visual A&P, Martini, Ober, Nath, and Petti: Pearson 2018. Required for both BIO 121 and 122. (Cost: $313.28, includes all materials needed for both BIO 121 and 122).
Visual A&P Lab Manual, Sarikas: Pearson 2018 (Cost: free when bundled with textbook, or $99.99 stand alone, required).
Mastering A&P, (Cost: free when bundled with textbook, or 89+ from publisher, required)

Course Content

General Learning Outcomes (GLOs)

- Communication: Students will demonstrate the ability to read, write, listen, and speak effectively.
- Reasoning and Inquiry: Students will demonstrate the ability to solve problems using deductive reasoning and logic, quantitative reasoning, or the scientific method.

Course Segments and Student Learning Outcomes

Course Segment	Learning Outcomes	Lecture Hours	Lab Hours	Clinical Hours
Introduction to Anatomy and Physiology	1. Define anatomy and physiology and explain how the two disciplines are interrelated. 2. Describe the universal characteristics of living organisms. 3. Differentiate between the major levels of organization in the human organism and give an example from each level. 4. Summarize the general function of the 11 organ systems and identify the major components of each system. 5. Describe and demonstrate anatomical position and explain its importance. 6. Use appropriate anatomical terms to describe body regions, body sections, and relative positions. 7. Describe the major body cavities of the trunk and their subdivisions, and identify the major organs found in each cavity. 8. Explain the concept of homeostasis. 9. Compare and contrast the roles of negative and positive feedback in homeostatic regulation; and provide examples of negative and positive feedback loops in the body.	3	3	0
Chemistry	1. Review basic chemistry from prerequisite course. Describe an atom and how atomic structure affects interactions between atoms. 2. Compare the ways in which atoms combine to form molecules and compounds. 3. Distinguish between the major types of chemical reactions that are important for studying physiology. 4. Explain the crucial role of enzymes in metabolism. 5. Distinguish between inorganic compounds and organic compounds. 6. Describe the chemical properties of water and its importance in physiology. 7. Explain pH and discuss its physiological significance. 8. Describe the physiological roles of acids, bases, and salts, and the role of buffers in the body fluids. 9. Describe isomers, monomers, and polymers, and the importance of functional groups in organic compounds. 10. Discuss the structures and functions of carbohydrates, lipids, proteins, and nucleic acids. 11. Discuss the structure and functions of high-energy compounds.	4	3	0

Course Segment	Learning Outcomes	Lecture Hours	Lab Hours	Clinical Hours
Cytology	1. Describe cell theory and the process of cellular differentiation. 2. List the functions of the plasma membrane and explain the structural features that enable it to perform those functions. 3. Describe the organelles of a typical cell and indicate the specific functions of each. 4. Provide an overview of cellular respiration and ATP synthesis. 5. Explain the functions of the cell nucleus and discuss the nature and importance of the genetic code. 6. Differentiate between DNA and RNA in terms of structure and roles in protein synthesis and summarize the processes of transcription and translation. 7. Name and describe the body's major fluid compartments and explain movement between them. 8. Describe the processes of cellular diffusion and osmosis and explain their role in physiological systems. Explore effects of changing tonicity on cells. 9. Describe carrier-mediated transport and vesicular transport mechanisms. 10. Describe the stages of the cell life cycle, including interphase, mitosis, and cytokinesis, and explain their significance.	5	3	0
Histology	1. Identify the four major types of tissues in the body and contrast their roles and special characteristics. 2. Classify the epithelial tissues based on structural characteristics (layers and cell shape), and describe the functions and locations of each, correlating structure with function. 3. Classify the specific connective tissues based on distinguishing structural characteristics, and describe the functions and locations of each type, correlating structure with function. 4. Compare the locations and functions of mucous, serous, cutaneous, and synovial membranes, and the structure and location of the three types of fasciae. 5. Compare and contrast the structural features, functions, and locations of each of the three types of muscle tissue. 6. Describe the basic structure and role of neural tissue and explain the structure of the neuron. 7. Describe the roles of inflammation, regeneration, and fibrosis in response to tissue injury. 8. Demonstrate the ability to use the compound microscope and to identify its parts. 9. Identify each specific type of epithelial, connective, muscle, and neural tissue using its full name, as well as the various cells and structures associated with each type. Provide an example of a location and a function for each. Spell the full terms correctly.	4	5	0
Integumentary System	1. Describe the structural features of the epidermis and dermis. Identify all layers and describe the functions of each layer. Discuss dermal blood supply and skin innervation. 2. Describe the structures and functions of the subcutaneous layer. 3. Describe the factors most responsible for individual differences in skin color. Discuss types of skin cancer. 4. Describe the classification of burns and the types of skin grafts. 5. Describe the structure of hair and hair follicles. Explain the basis of hair color and describe the mechanism of hair production. 6. Compare and contrast sebaceous and sweat glands (eccrine, apocrine, mammary, and ceruminous) with respect to their location and functions of their secretions. 7. Describe the structure and function of a typical nail. 8. Explain how the skin responds to injury and repairs itself. 9. Describe the interaction between sunlight and endocrine function as they relate to the skin. 10. Summarize the effects of aging on the skin. 11. Identify all skin structures on models and illustrations. Spell the full terms correctly.	3	3	0

Course Segment	Learning Outcomes	Lecture Hours	Lab Hours	Clinical Hours
Skeletal System	1. Describe the major regions of the skeleton and explain the primary components and functions of the skeletal system. 2. Classify bones according to shape and internal organization and explain the functional significance of each of the major types of bone markings. 3. Identify the cell types in bone and explain their major functions. Discuss the chemical composition of bone matrix and the importance of its organic and inorganic components. 4. Compare the mechanisms of endochondral and intramembranous ossification. Discuss the process of bone growth and explain the hormonal regulation of skeletal growth. 5. Discuss the effects of aging, physical stress, hormones, and nutrition on bone development and bone remodeling. 6. Explain the role of the skeletal system in blood calcium regulation. 7. Describe the types of fractures and explain how fractures heal. 8. Summarize the sex differences and age-related changes in the human skeleton. 9. Identify all axial and appendicular bones and major bony landmarks on models, postcranial specimens, and illustrations. Spell the full terms correctly.	5	6	0
Arthrology (Joints)	1. Classify the joints according to their structure and range of motion. 2. Describe the anatomical components of a typical synovial joint, including the common accessory structures and their functions. 3. Name and describe (or perform) the common body movements. 4. Compare the six types of synovial joints based on their structure and the movement(s) allowed and identify the locations in the body where each type is found. 5. Compare the general relationship between joint stability and range of motion for axial and appendicular joints. 6. Describe the joints of the vertebral column. 7. Compare and contrast the shoulder and hip joints in terms of articulating bones, anatomical characteristics of the joint, movement allowed, and joint stability. 8. Describe the structure and function of the elbow and knee joint. 9. Describe the effects of aging on joints and discuss the most common clinical problems for joints.	3	3	0
Muscular System	1. Compare and contrast the three types of muscle tissue in terms of structure, location, function, and rate of contraction. 2. Describe the gross anatomy of a skeletal muscle. Include connective tissue coverings, muscle attachments, blood supply, and innervation. 3. Describe the microscopic structure of a skeletal muscle fiber. Identify the structural components of a sarcomere and briefly summarize the sliding filament theory including the roles of calcium and ATP. 4. Describe the distribution of charges on either side of the plasma membrane at rest, and the importance of excitable membranes in generating an action potential. 5. Identify the components of the neuromuscular junction, and summarize the events involved in neural control of skeletal muscle contraction and relaxation. 6. Describe the mechanism responsible for tension production in a muscle fiber. 7. Discuss the factors affecting tension production during contraction of an entire skeletal muscle and explain the role of the motor unit in this process. 8. Compare the different types of skeletal muscle contractions. 9. Describe the mechanisms by which muscle fibers obtain energy to power contractions and distinguish between the energy requirements of an exercising and resting muscle. Discuss muscle fatigue and oxygen debt. 10. Relate the types of muscle fibers to muscle performance, discuss muscle hypertrophy, atrophy, and aging, and compare the effects of aerobic and resistance exercise on skeletal muscle. 11. Predict the actions of a muscle based on its origin and insertion, and explain how muscles interact to produce or oppose movements. 12. Correlate muscle groups with movements of body parts. Differentiate between agonists, synergists, and antagonists and give examples of each. 13. Identify the principal axial and appendicular muscles of the body on models and human cadavers, and cite their origins, insertions, and actions. Spell the full terms correctly.	5	9	0

Course Segment	Learning Outcomes	Lecture Hours	Lab Hours	Clinical Hours
Nervous System I: Neural Tissue and Neurophysiology	1. Diagram the general organization of the nervous system. 2. Sketch and label the structure of a typical neuron, describe the function of each component, and classify neurons by structure and function. 3. Describe the locations and functions of neuroglia in CNS and PNS. 4. Explain how the resting membrane potential is established and maintained and how the membrane potential can change. 5. Describe the functions of the gated ion channels with respect to the permeability of the plasma membrane. 6. Describe graded potentials. 7. Describe the events involved in generation and propagation of an action potential and interpret a graph of an action potential. 8. Discuss the factors that affect the speed with which action potentials are propagated. 9. Compare and contrast graded potentials with action potentials. 10. Describe the general structure of synapses, and discuss the events that occur at a chemical synapse. 11. Discuss the significance of postsynaptic potentials and contrast the roles of excitatory and inhibitory postsynaptic potentials. 12. Describe the major types of neurotransmitters. 13. Summarize the key factors that influence postsynaptic response (information processing). Include the roles of facilitation, inhibition, stimulus frequency, and neuromodulators.	4	3	0
Nervous System II: Brain and Cranial Nerves	1. Name the major regions and anatomical landmarks of the adult brain and describe the locations and functions of each. 2. Explain how the brain is protected and supported, and discuss the formation, circulation, and function of the cerebrospinal fluid. 3. Correlate the individual components of the brainstem, cerebellum, diencephalon, limbic system, and reticular formations with their major functions and locations. 4. Describe the organization of the cerebrum, including surface anatomy, major surface landmarks, hemispheres, and lobes. 5. Identify the major anatomical subdivisions and functions of the cerebrum and discuss the origin and significance of the types of brain waves seen on electroencephalograms. 6. Identify the cranial nerves by name and number and describe the general distribution and functions of each. 7. Categorize and describe the functions of the general sensory receptors. 8. Differentiate between sensory and motor pathways. 9. Identify and explain ascending and descending tracts. 10. Discuss the various levels of somatic motor control. 11. Identify the principal components of the brain and spinal cord, as well as select cranial and peripheral nerves of the body on models, human cadavers, and illustrations. Spell the full terms correctly.	5	4	0

Course Segment	Learning Outcomes	Lecture Hours	Lab Hours	Clinical Hours
Nervous System III: Spinal Cord, Spinal Nerves, and Autonomic Nervous System (ANS)	1. Explain the organization of the spinal cord and spinal nerves. 2. Describe the spinal meninges and relate them to those of the brain. 3. Explain the roles of white matter and gray matter in processing and relaying sensory information and motor commands. 4. Explain a nerve plexus and describe the general distribution and function of the peripheral nerves arising from each plexus. 5. Explain neuronal pools and discuss various types of neural circuits. 6. Explain the components of a reflex arc. 7. Differentiate between types of reflexes and explain how each works. 8. Compare the organization of the autonomic nervous system with that of the somatic nervous system and describe the divisions and major functions of the ANS. 9. Compare parasympathetic and sympathetic systems in terms of their structure, innervation patterns, functions, neurotransmitters, receptors, and interactions. 10. Explain how the divisions of the autonomic nervous system work to maintain homeostasis and describe autonomic tone. 11. Explain the clinical manifestations of select neurological diseases and disorders. 12. Identify the principal components of the brain and spinal cord, as well as select cranial and peripheral nerves of the body on models, human cadavers, and illustrations. Spell the full terms correctly.	4	3	0

Total Contact Hours

Lecture Hours	Lab Hours	Clinical Hours
45	45	0