

**Course Outline**  
**Anatomy and Physiology**

**Course Description:**

**BI240.** Anatomy and Physiology. 5 hours credit. Prerequisite: Highly recommended BI105 and IS201. Three hours of lecture and four hours of laboratory per week. An intermediate study designed primarily for pre-professional students in health-related fields. Basic principles in structure and function of the human body systems are studied.

**Required Textbook:**

Saladin, K. S. (2004). *Anatomy and Physiology: The Unity of Form and Function* (4th Ed.). McGraw Hill.

FOR CAT DISSECTION: Wischnitzer, S. (1990). *Anatomy of the Cat Series*, W.H. Freeman. Exercise 3 - Muscular system, Exercise 4 - Digestive and Respiratory System, Exercise 5 - Circulatory system, and Exercise 6 - Urogenital system.

**Course Objectives:**

At the successful completion of this course, the student should be able to:

1. Describe the chemical makeup of the body
  - a. Distinguish between ionic and covalent bonds
  - b. List characteristics of inorganic and organic compounds
  - c. Describe the components, shape and functions of carbohydrates, lipids, proteins, and nucleotides
  - d. Describe the overall process of cellular respiration.
  
2. Identify and describe cells and tissues found in the body.
  - a. Identify the basic structures within a cell
  - b. Describe functions of the basic structures in a cell
  - c. Describe forms of molecular transport through the cell membrane
  - d. List and describe the major tissue types, structure and function.
  - e. Recognize specific examples of tissues, name locations and state functions.
  
3. Examine the integumentary system
  - a. List and describe the layers of the skin, types of glands, and other accessory structures
  - b. Describe the functions of the integumentary system and the functions of the individual structures
  - c. Identify the regions of the skin and other structures.

4. Outline the skeletal system
  - a. Label the bones and their features
  - b. Describe the tissues found and organization of bones
  - c. Categorize the bones by shape and region
  - d. Describe the process of ossification
  - e. List the functions of bones and the skeletal system
  - f. Explain the substances that influence bone development
  - g. Describe the various articulations.
  
5. Describe the muscular system
  - a. Describe the functions associated with the muscular system and muscles
  - b. Explain the organization of a muscle fiber and the specialized structures found in muscle fibers and muscle organs
  - c. Outline the events of muscle contraction and relaxation
  - d. Explain the role and production of adenosine triphosphate (ATP)
  - e. Identify skeletal muscles and their functions.
  
6. Examine the nervous system
  - a. Label the organs of the nervous system
  - b. Describe chemical and electrical impulse conduction
  - c. Differentiate the various divisions of the nervous system
  - d. Describe the types of tissue and their arrangement
  - e. Label the components of the reflex arc, distinguish between monosynaptic and polysynaptic reflexes
  - f. Distinguish between motor, sensory, and association functions related to the lobes of the cerebral cortex
  - g. Explain the functions of the brain, cranial nerves, spinal cord, spinal nerves, and peripheral nerves.
  
7. Outline the endocrine system
  - a. Identify organs of the endocrine system
  - b. Describe the tissues found in glands
  - c. Describe the location and functions of glands
  - d. Distinguish between steroid and non-steroid hormones
  - e. Explain the modes of action and regulation of hormone levels
  - f. Describe specific feedback mechanisms, including insulin and blood glucose levels and anti-diuretic hormone with fluid levels.
  
8. Examine the cardiovascular system
  - a. Label the components of the heart and blood vessels
  - b. Describe tissues found in these organs
  - c. Explain the functions and regulation of the heart and blood vessels
  - d. Describe the cardiac conduction system and regulation by the autonomic nervous system
  - e. Describe components and functions of blood as well as the typing systems.

9. Investigate the respiratory system
  - a. Identify the organs of respiratory system
  - b. Explain the tissue arrangement of the organs
  - c. Describe the functions of the upper and lower respiratory tract
  - d. Describe how the gases are transported within the body
  - e. Describe the mechanisms and regulation of breathing.
  
10. Examine the digestive system
  - a. List the organs and accessory structures of the digestive system
  - b. Describe the tissue arrangement of the gastrointestinal organs
  - c. Identify the organs of the digestive system
  - d. Describe the various functions of organs and accessory structures.
  
11. Outline the lymphatic system
  - a. Describe the organs and vessels of the lymphatic system
  - b. Identify the components of lymph fluid
  - c. Describe tissue arrangement of the organs
  - d. Identify the location and describe the functions of the lymphatic structures
  - e. Explain the antibody-antigen interaction as part of the immune response.
  
12. Investigate the urinary system
  - a. Identify the organs of the urinary system
  - b. Label microscopic components and describe functions of the nephron
  - c. Describe organization of the kidneys, ureters, urinary bladder, and urethra
  - d. List the functions of each organ
  - e. Explain urine formation
  - f. Describe how fluid, electrolyte, and acid-base levels are regulated
  - g. Explain chemical and physiological buffering systems
  - h. Distinguish between acidosis, alkalosis both metabolic and respiratory.
  
13. Examine the male and female reproductive systems
  - a. Identify organs and accessory structures of male and female systems
  - b. Describe tissue arrangement, location and functions of organs and accessory structures
  - c. Describe hormonal interactions in both male and female systems.

### **Topical Outlines of Units:**

- I. Biochemistry
  - a. Types of chemical bonds
  - b. Inorganic and organic compounds
  - c. Carbohydrates, lipids, proteins, and nucleotides
  - d. Cellular respiration.

- II. Cells and tissues
  - a. Cell structures
  - b. Cell functions
  - c. Composition of cell membrane and modes of transport
  - d. Major types of tissues: structure and function
  - e. Individual tissues.
  
- III. Integumentary system
  - a. Skin, glands, and other accessory structures
  - b. Functions of the system and the individual structures
  - c. Regions of the skin.
  
- IV. Skeletal system
  - a. Bones and their features
  - b. Osseous tissues and organization of bones
  - c. Shapes and subdivisions
  - d. Ossification
  - e. Functions of bones and the skeletal system
  - f. Chemical substances that influence bone development
  - g. Articulations.
  
- V. Muscular system
  - a. Functions of the system and muscles (organs)
  - b. Organization of a muscle fiber and muscle organs
  - c. Muscle contraction and relaxation
  - d. Adenosine triphosphate (ATP)
  - e. Identify skeletal muscles and their functions.
  
- VI. Nervous system
  - a. Organs of the nervous system
  - b. Chemical and electrical impulse conduction
  - c. Divisions of the nervous system
  - d. Tissues, cells and arrangement
  - e. Reflex arc, monosynaptic and polysynaptic reflexes
  - f. Specific functions of the lobes of the cerebral cortex
  - g. Functions of brain, nerves, and spinal cord.
  
- VII. Endocrine system
  - a. Organs
  - b. Tissues and glands
  - c. Location and functions
  - d. Steroid and non-steroid hormones
  - e. Modes of action and regulation of levels.
  - f. Feedback mechanisms: insulin/blood glucose levels, antidiuretic hormone/fluid levels.

- VIII. Cardiovascular system
  - a. Heart and blood vessels
  - b. Tissue arrangement
  - c. Functions and regulation
  - d. Describe the cardiac conduction
  - e. Blood
  
- IX. Respiratory system
  - a. Organs
  - b. Tissues
  - c. Functions of the upper and lower respiratory tract
  - d. Gas transport
  - e. Mechanisms and regulation of breathing.
  
- X. Digestive system
  - a. Organs and accessory structures
  - b. Tissue arrangement
  - c. Organ identification and location
  - d. Functions.
  
- XI. Lymphatic system
  - a. Organs and vessels
  - b. Lymph
  - c. Components
  - d. Location and functions
  - e. Antibody-antigen interaction.
  
- XII. Urinary system
  - a. Organs
  - b. Nephron
  - c. Tissues of the organs
  - d. Functions
  - e. Urine formation
  - f. Fluid, electrolytes, and acid-base
  - g. Buffering systems
  - h. pH imbalances.
  
- XIII. Male and Female reproductive systems
  - a. Organs and accessory structures
  - b. Description, location and functions
  - c. Hormonal interactions.

### **Methods of Instruction**

The following methods may be used individually or in combination for both the lecture and laboratory sections: lecture, class discussion, demonstrations, handouts, audio-visual aides, study guides, film loops, quizzes, unit exams, and lab practical exams.

Laboratory demonstrations (may) include dissection of cats and examining sheep organs (heart, brain, and kidney). Examining a human cadaver. Observation of external and internal features of the integumentary, skeletal, muscular, nervous, digestive, respiratory, circulatory, reproductive, and urinary systems throughout the semester.

**Methods of Evaluation**

There will be lecture exams and laboratory practical exams will be given over the semester. Grade determination will be dependent upon total number of points from: tests, quizzes, assignments, and/or attendance.