Anatomy and Physiology (Learning Objectives guided by textbook: Susannah Nelson Longenbaker, Understanding Human Anatomy and Physiology 6th Edition)

1. Organization of the Body
    a. The Human Body
        i. Students will define anatomy and physiology, and explain how they are related
        ii. Students will describe each level of organization of the body with reference to an example
    b. Anatomical Terms
        i. Students will use anatomical terms to describe the relative positions of the body parts, the regions of the body and the planes by which the body can be sectioned
    c. Body Cavities and Membranes
        i. Students will list the cavities of the body, and state their locations
        ii. Students will name the organs located in each of the body cavities
        iii. Students will name the membranes that line each body cavity and adhere to the organs
    d. Organ Systems
        i. Students will list the organ systems of the body, and state the major organs associated with each
        ii. Students will describe in general the functions of each organ system
    e. Homeostasis
        i. Students will describe how a feedback system maintains homeostasis
2. Chemistry of Life
    a. Nucleic Acids
        i. Students will describe the structure and function of DNA and RNA in cells
3. Cell structure and Function
    a. Cellular Organization
        i. Students will name the three main parts of a human cell
        ii. Students will describe the structure and function of the plasma membrane
        iii. Students will describe the structure and function of the nucleus
        iv. Students will describe the structures and roles of the endoplasmic reticulum and the Golgi apparatus in the cytoplasm
        v. Students will describe the lysosomes and the role of these organelles in the breakdown of molecules
        vi. Students will describe the structure of mitochondria and their role in producing ATP
        vii. Students will describe the structure of centrioles, cilia and flagella and their roles in cellular movement
        viii. Students will describe the structure and function of the cytoskeleton
    b. Crossing the Plasma Membrane

i. Students will describe how substances move across the plasma membrane and distinguish between passive and active transport

c. The Cell Cycle
    i. Students will describe the phases of the cell cycle
    ii. Students will describe, as a part of interphase, the process of DNA replication
    iii. Students will, as a part of interphase, describe how cells carry out protein synthesis
    iv. Students will describe the phases of mitosis and explain the function of mitosis

4. Body Tissues and Membranes
    a. Epithelial Tissue
        i. Students will describe the general characteristics and functions of epithelial tissue
        ii. Students will name the major types of epithelial tissue and relate each one to a particular organ
    b. Connective Tissue
        i. Students will describe the general characteristics and functions of connective tissue
        ii. Students will name the major types of connective tissue, and relate each one to a particular organ
    c. Muscular Tissue
        i. Students will describe the general characteristics and functions of muscle tissue
        ii. Students will name the major types of muscular tissue and relate each one to a particular organ
    d. Nervous Tissue
        i. Students will describe the general characteristics and functions of nervous tissue
    e. Extracellular Junctions, Glands and Membranes
        i. Students will describe the structure and function of three types of extracellular junctions
        ii. Students will describe th4 difference between an exocrine and an endocrine gland with examples
        iii. Students will describe the way the body's membranes are organized
        iv. Students will name and describe the major types of membranes in the body
5. The Integumentary System
    a. Structure of the Skin
        i. Students will describe the regions of the skin and the hypodermis
        ii. Students will name two main epidermal layers and describe their structure and function
    b. Accessory Structures and the Skin

i. Students will describe the structure and growth of hair and nails
ii. Students will name three glands of the skin and describe their structure and function

c. Disorders of the Skin
i. Students will name the three types of skin cancer, and state their risk factor
ii. Students will name and describe four types of burns with regard to their depth
iii. Students will describe how the 'rule of nines' may be used to estimate the extent of a burn
iv. Students will describe the steps by which a skin wound heals

d. Effects of Aging
i. Students will describe the anatomical and physiological changes that occur in the integument as we age

e. Homeostasis
i. Students will list and discuss four functions of the skin that contribute to homeostasis

6. The Skeletal System
a. Overview
i. Students will name at least five functions of the skeleton
ii. Students will explain a classification of bones based on their shapes
iii. Students will describe the anatomy of a long bone
iv. Students will describe the growth and development of bones
v. Students will name and describe six types of fractures, and state the four steps in fracture repair

b. Axial Skeleton
i. Students will distinguish between the axial and appendicular skeletons
ii. Students will name the bones of the skull, and state the important features of each bone
iii. Students will describe the structure and function of the hyoid bone
iv. Students will name the bones of the vertebral column and the thoracic cage and be able to label diagrams of each
v. Students will describe a typical vertebra, the atlas and axis, and the sacrum and coccyx
vi. Students will name three types of ribs and the three parts of the sternum

c. Appendicular Skeleton
i. Students will name the bones of the pectoral girdle and the pelvic girdle and be able to label diagrams of them
ii. Students will name the bones of the upper limb and the lower limb and be able to label diagrams that include surface features
iii. Students will cite at least five differences between the female and the male pelvises

d. Joints

i. Students will explain how joints are classified and give examples of each type of joint
ii. Students will list the types of movements that occur at synovial joints

e. Effects of aging
i. Students will describe the anatomical and physiological changes that occur in the skeletal system as we age

f. Homeostasis
i. Students will list and discuss six ways the skeletal system contributes to homeostasis and discuss ways the other systems assist the skeletal system

7. The Muscular System
a. Functions and Type of Muscle
i. Students will distinguish between the three types of muscles, and tell where they are located in the body
ii. Students will describe the connective tissues of a skeletal muscle
iii. Students will name and discuss functions of skeletal muscles

b. Microscopic Anatomy and Contraction of Skeletal Muscle
i. Students will name the components of a skeletal muscle fiber, and describe the function of each
ii. Students will explain how skeletal muscle fibers are innervated and how they contract
iii. Students will describe how ATP is made available for muscle contraction

c. Skeletal Muscles of the Body
i. Students will discuss how muscles work together to achieve the movement of a bone
ii. Students will give examples to show how muscles are named
iii. Students will describe locations and actions of the major skeletal muscle of each body region

d. Homeostasis
i. Students will describe how the muscular system works with other systems of the body to maintain homeostasis

8. The Nervous System
a. Nervous System Overview
i. Students will describe the three functions of the nervous system
ii. Students will describe the structure of a neuron and the functions of the three types of neurons
iii. Students will explain how a nerve impulse is conducted along a nerve and across a synapse

b. Central Nervous System
i. Students will describe the main parts of the brain and the lobes of the cerebral cortex and state the functions for each structure
ii. Students will describe the structure of the spinal cord, and state its functions

iii. Students will describe the three layers of meninges, and state the functions of the meninges
iv. Students will describe the location and function of the cerebrospinal fluid

c. Peripheral Nervous System
i. Students will describe the structure of a nerve, and distinguish between sensory, motor and mixed nerves
ii. Students will describe the structure of a reflex arc and the function of a reflex arc
iii. Students will define and escribe the autonomic nervous system
iv. Students will distinguish between the sympathetic and parasympathetic divisions in four ways, and give examples of their respective effects on specific organs

d. Homeostasis
i. Students will describe how the nervous system works with other systems to maintain homeostasis

9. The Sensory System
a. General Senses
i. Students will categories sensory receptors according to five types of stimuli
ii. Students will discuss the function of proprioceptors
iii. Students will relate specific sensory receptors in the skin to particular senses in the skin
iv. Students will discuss the phenomenon of referred pain

b. Taste and Smell
i. Students will name the chemoreceptors and state their location, anatomy and mechanism of action

c. Vision
i. Students will describe the anatomy and function of the accessory organs of the eye
ii. Students will describe the anatomy of the eye and give a function to each part
iii. Students will describe the sensory receptors for sight, their mechanism of action and the mechanism for stereoscopic vision
iv. Students will describe some common disorders of sight

d. Hearing
i. Students will describe the anatomy of the ear, and give a function to each part
ii. Students will describe the sensory receptors for hearing and their mechanism of action
iii. Students will describe the sensory receptors for equilibrium and their mechanism of action

10. Blood and the Cardiovascular System
a. Composition and Function of Blood

i. Students will describe, in general, the composition of blood
ii. Students will divide the functions of blood in three categories and discuss each category

b. Capillary Exchange
i. Students will describe the capillary exchange within the tissues

c. Blood Typing
i. Students will explain the ABO and Rh systems of blood typing
ii. Students will explain agglutination and relationship to transfusions

d. Anatomy of the Heart
i. Students will describe the location of the heart and its functions
ii. Students will describe the wall and coverings of the heart
iii. Students will trace the path of blood through the heart, naming its chambers and valves
iv. Students will Describe the operation of the heart valves
v. Students will describe the coronary circulation and discuss several coronary circulation disorders and possible treatments

e. Physiology of the Heart
i. Students will describe the conduction system of the heart
ii. Students will identify an electrocardiogram
iii. Students will describe the cardiac cycle and heart sounds
iv. Students will describe the cardiac output and regulation of the heartbeat

f. Anatomy of the Blood Vessels
i. Students will name the three types of blood vessels and describe their structure and function

g. Physiology of Circulation
i. Students will explain how blood pressure changes through the vascular system and describe the factors that determine blood pressure
ii. Students will describe how blood pressure is regulated
iii. Students will define pulse and tell where the pulse may betaken
iv. Students will describe shock due to hypertension

h. Circulatory Routes
i. Students will name the two circuits of the cardiovascular system and trace the path of blood from the heart to any organ in the body and back to the heart
ii. Students will describe the major systematic arteries and veins

11. Respiratory System
a. Respiration Overview
i. Students will describe the events that comprise respiration
ii. Students will describe the structure and function of the respiratory system organs
iii. Students will describe the structure and importance of the respiratory membrane

b. Mechanism of Breathing
    i. Students will describe vital capacity and its relationship to other measurements of breathing capacity
    ii. Students will describe ventilation including inspiration and expiration
c. Gas Exchange and Transport
    i. Students will describe the process of gas exchange in the lungs and the tissues
    ii. Students will explain how oxygen and carbon dioxide is transported in the blood

12. Digestive System
    a. Anatomy of the Digestive System
        i. Students will trace the path of food through the alimentary canal and describe the general structure and function of each organ mentioned
        ii. Students will describe peristalsis and state tis function
        iii. Students will describe the wall of the small intestine and relate its anatomy to nutrient absorption
        iv. Name the hormones produced by the alimentary canal that help control digestive secretions
    b. Accessory Organs of Digestion
        i. Students will name five accessory organs of digestion
        ii. Students will describe the location, anatomy and functions of the pancreas, the liver and the gallbladder
        iii. Students will name and describe disorders of the liver
    c. Chemical Digestion
        i. Students will name and state the functions of the digestive system enzymes for carbohydrates, proteins and fats
    d. Nutrition
        i. Students will state the functions of glucose, fats, and amino acids in the body
13. Reproductive System
    a. Human Life Cycle
        i. Students will discuss the functions of the reproductive system
    b. Male Reproductive System
        i. Students will trace the path of sperm, form the testes to the urethra
        ii. Students will name the glands and d3escribve the secretions that contribute to the composition of semen
        iii. Students will describe the anatomy of the penis and events preceding and during ejaculation
        iv. Students will Discuss that actions of testosterone and hormone regulation in males
    c. Female Reproductive System
        i. Students will label a diagram of the external female genitals

ii. Students will describe the menstrual cycle
iii. Students will describe the actions of estrogen and progesterone

d. Fetal Pig Dissections
    i. Students will perform a whole-body dissection of a vertebrae
    ii. Students will identify the major anatomical features of the vertebrate body in a dissected specimen
    iii. Students will understand the relationship between structure and vertebrate body and relate concepts covered in lecture to structures found in the pig
    iv. Students will understand mammalian fetal circulation from a mechanical, physiological and evolutionary perspective
    v. Students will apply knowledge and understanding acquired to problems in human physiology
    vi. Students will apply knowledge and understanding acquired to explain organismal adaptive strategies