

# Anatomy and Physiology Course Outline

## Unit 1 – Levels of Organization

- I. Introduction to Anatomy and Physiology
  - a. Definition of anatomy and physiology
  - b. Levels of organization (cells-tissue-organs-organ system-etc.)
  - c. Characteristics of life (NESTGRRR + M)
  - d. Homeostasis (Review from living environment class)
  - e. Organization of the human body (general overview of body cavities, membranes, organ systems)
  - f. Anatomical terminology
    - i. Relative positions (superior, anterior, posterior, dorsal, ventral, etc.)
    - ii. Body sections (sagittal, transverse, coronal, etc.)
    - iii. Body regions (epigastric, iliac, umbilical, lumbar, etc.)
- II. Basic Chemistry
  - a. Structure of matter (elements, atoms, bonding, molecules, compounds, acids, bases, etc.)
  - b. Organic vs. Inorganic compounds (family of four organics)
- III. Cells
  - a. Organelles (nucleus, cell membrane, golgi, mitochondria, etc.)
  - b. Cell processes (passive & active transport, phagocytosis, pinocytosis, etc.)
  - c. Cell cycle (interphase, prophase, metaphase, anaphase, telophase)
  - d. Cell differentiation (types of cells- skin, blood, connective, etc.)
- IV. Cellular metabolism
  - a. Metabolic reactions (anabolism, catabolism, hydrolysis, dehydration synthesis)
  - b. Control of metabolic reactions (enzymes)
  - c. Energy for metabolic reactions (cellular respiration, ATP, anaerobic vs. aerobic)
  - d. DNA (structure, replication, protein synthesis, mutations)
- V. Tissues
  - a. Epithelial (squamous, cuboidal, columnar, stratified, etc.)
  - b. Connective (fibroblasts, macrophages, elastic fibers, adipose, etc.)
  - c. Membranes (serous, mucous, cutaneous, synovial, etc.)
  - d. Muscle (skeletal, smooth, cardiac)
  - e. Nervous (neurons, neuroglial)

## Unit 2 – Support and Movement

- I. Integumentary system
  - a. Skin and tissues (epidermis, dermis, melanin, etc.)
  - b. Accessory structures of the skin (nails, hair follicles, sebaceous glands, sweat glands)
  - c. Regulation of body temperature
  - d. Healing of wounds
  - e. Common skin disorders
- II. Skeletal system

- a. Bone structure (bone classification, parts of a long bone, etc.)
  - b. Bone development and growth
  - c. Bone function (body movement, blood cell formation, fractures, etc.)
  - d. Skeletal organization (names of bones):
    - i. Skull
    - ii. Vertebral column (cervical, thoracic, lumbar)
    - iii. Thoracic cage
    - iv. Pectoral girdle
    - v. Upper limb
    - vi. Pelvic girdle
    - vii. Lower limb
  - e. Joints (hinge, ball and socket, pivotal, etc.)
  - f. Common bone disorders
- III. Muscular system
- a. Structure of skeletal muscle (fibers, neuromuscular junction)
  - b. Skeletal muscle contraction (myosin, actin, energy sources, oxygen debt, fatigue, heat production)
  - c. Muscular responses (threshold stimulus, twitch, latent period)
  - d. Smooth muscle (fibers, contraction)
  - e. Cardiac muscle
  - f. Skeletal muscle actions (origin and insertion, prime mover, antagonists)
  - g. Major skeletal muscles (names of muscles)
  - h. Common muscle disorders

### Unit 3 – Integration and Coordination

- I. Nervous system
  - a. General functions of the nervous system (sensory receptors, effectors)
  - b. Neuroglial cells
  - c. Neurons (structure, classification)
  - d. The synapse (neurotransmitters)
  - e. Cell membrane potential
  - f. Nerve impulses
  - g. Synaptic transmission (excitatory and inhibitory actions)
  - h. Types of nerves (sensory, motor, interneurons)
  - i. Nerve pathways (reflexes)
  - j. Meninges
  - k. Spinal cord
    - l. Brain (parts and functions)
  - m. Peripheral nervous system (cranial, spinal)
  - n. Autonomic nervous system (sympathetic, parasympathetic)
  - o. Common nervous system disorders
- II. The senses
  - a. Receptors, sensations, and perception
  - b. General senses (touch, temperature, pain, )
  - c. Special senses (smell, taste, hearing, equilibrium, sight)
- III. Endocrine system
  - a. Hormone action (steroid, nonsteroid, prostaglandins)
  - b. Control of secretions (negative vs. positive feedback)
  - c. Pituitary gland (the master gland's control over other glands)

- d. Types of glands and their functions (thyroid, parathyroid, adrenal, pancreas, pineal, thymus)
- e. Stress and health
- f. Common endocrine system disorders

#### Unit 4 – Transport

- I. Blood
  - a. Blood cells (red, white, platelets)
  - b. Blood plasma (proteins, albumins, globulins, fibrinogen, gases, nutrients, electrolytes)
  - c. Hemostasis (coagulation, blood clots)
  - d. Blood types and transfusions (antigens, antibodies, ABO blood groups, Rh blood groups)
  - e. Common disorders of the blood
- II. Cardiovascular system
  - a. Structure of the heart (chambers, valves, blood pathway)
  - b. Heart actions (diastole, systole, SA & AV nodes, ECG)
  - c. Blood vessels (arteries, capillaries, veins)
  - d. Blood pressure (blood volume, blood viscosity)
  - e. Paths of circulation (pulmonary, systemic, renal, etc.)
  - f. Types of arteries (aorta, iliac, subclavian, carotid, etc.)
  - g. Types of veins (jugular, basilic, cephalic, hepatic portal, etc.)
  - h. Common disorders of the cardiovascular system
- III. Lymphatic system and Immunity
  - a. Lymph pathways (lymphatic capillaries, lymphatic vessels, collecting ducts)
  - b. Lymph movement (nodes)
  - c. Thymus and spleen structure and function
  - d. Bodies defense against infection (pathogens, specific vs. nonspecific defenses)
  - e. Nonspecific defense (species resistance, mechanical barriers, chemical barriers, NK cells, inflammation, phagocytosis, fever)
  - f. Specific defenses (antigens, lymphocytes, T cells, B cells, antibodies, immune response)
  - g. Common disorders of the immune system (allergies, tissue rejection, autoimmunity)

#### Unit 5 – Absorption and Excretion

- I. Respiratory system
  - a. Organs of the respiratory system (nose, nasal cavity, sinuses, pharynx, larynx, trachea, bronchioles, lungs)
  - b. Breathing mechanism (inhalation, exhalation, air volumes and capacities)
  - c. Control of breathing (factors affecting breathing rate)
  - d. Gas exchange (alveoli)
  - e. Gas transport (hemoglobin, hypoxia)
  - f. Disorders of the respiratory system
- II. Digestive system and nutrition
  - a. General characteristics of the alimentary canal (structure of the wall, movements of the tube)
  - b. Mouth (cheeks, lips, tongue, palate, teeth)

- c. Salivary glands
  - d. Pharynx and esophagus
  - e. Stomach (parts, gastric secretions)
  - f. Pancreas (structure, secretions)
  - g. Liver (structure, functions, bile, gallbladder)
  - h. Small intestine (parts, secretions, absorption, movements)
  - i. Large intestine (parts, functions, movements, feces)
  - j. Nutrients and nutrition (6 major nutrients, adequate diets, food pyramid)
  - k. Disorders of the digestive system
- III. Urinary system
- a. Kidneys (location, structure, function, renal blood vessels, nephrons)
  - b. Urine formation
  - c. Urine elimination (ureters, urinary bladder, urethra)
  - d. Disorders of the urinary system