BIOLOGY 217
HUMAN ANATOMY & PHYSIOLOGY I

FINAL EXAM REVIEW SHEET

Material Covered on Exam: Chapters 1-16, emphasis on 15-16 since they have not been tested yet. Chapters 1-14 will be ~40%, and the remaining portion will be 15-16.

For this exam, you will be expected to . . .

- Be able to define anatomy and physiology and the subdivisions of each.
- Be able to describe the common functions of life and name the basic requirements necessary to maintain human life.
- Name the different levels of structural organization that make up the human body and explain their relationships.
- List the organ systems of the body, identify their major organs or components, and briefly describe the major functions of each system.
- Define homeostasis and the three components of homeostatic regulation.
- Describe how positive and negative feedback maintains homeostasis. Give at least two examples of each.
- Describe anatomical position.
- Be able to correctly identify root words, prefixes, and suffixes commonly used in anatomy and physiology.
- Be able to correctly identify superficial and regional terms commonly used to indicate locations on or in the body.
- Be able to correctly identify the body directions and planes.
- Locate and name the major body cavities and the subdivisions of each.
- Be able to list the major organs contained within each body cavity and name the membrane lining each cavity.
- Name the nine abdominopelvic regions and list the organs they contain.
- Name the four quadrants of the abdominopelvic cavity and list the organs they contain.
- Differentiate between matter, work, and energy.
- List and describes the different states of matter.
- Define a chemical element and list the elements that make up 96% of body matter and the most common elements that make up the remaining 4%.
- Define atom. List the subatomic particles; describe their relative masses, charges, and location within the atom.
- Be able to name the first three electron shells and give the maximum number of electrons that each can hold.
- If given an element from the periodic table, be able to identify the element by its chemical symbol, give its atomic number and atomic mass. Be able to use this information to determine the number of protons, neutrons, and electrons for the element.
- Define neutral atom, isotope, isomer, ion, cation, and anion.
- Draw planetary models of neutral atoms from elements 1 - 20 on the periodic table.

- Explain the role of valence electrons and the octet rule in the formation of chemical bonds. What does it mean if an atom is reactive or inert?
- Distinguish between a compound and a molecule.
- Differentiate between mixtures, covalent bonds, ionic bonds, and hydrogen bonds.
- Compare and contrast polar and non-polar molecules. Give an example of each.
- Be able to describe the components of a chemical reaction, list the rules of chemical notation, and define three basic types of chemical reactions.
- Define endergonic, exergonic, metabolites, inorganic nutrient, and organic nutrients.
- Explain the importance of water in the human body.
- Be able to define the following terms: hydrophobic, hydrophilic, adhesion, cohesion, surface tension, solute, solvent, electrolyte, and hydration sphere.
- Define acids, bases, and neutrals with respect to H^+ and OH^- and explain the concept of the pH scale relative to each.
- Be able to define the term salts and buffers.
- Compare and contrast the monomers, polymers, and biological functions for each of the four organic compounds: carbohydrates, proteins, lipids, and nucleic acids.
- Explain the role of dehydration synthesis and hydrolysis in the formation and breakdown of organic compounds.
- Differentiate between saturated and unsaturated fatty acids.
- Describe the four levels of protein structure.
- Describe the importance of enzymes to chemical reactions and differentiate between the following: substrate, active site, activation energy, denaturation, and catalyst.
- List the components of a nucleotide.
- List the differences between DNA and RNA.
- Define the basic components of the cell theory.
- Describe the structure and design of the plasma membrane and relate its components (various proteins, glycocalyx, and cholesterol) to membrane function.
- Describe the functions of the peripheral and integral proteins.
- Define the function of the various membranous and non-membranous organelles found within the cytoplasm of the cell.
- Describe the structure and function of the nucleus, nuclear envelope, nuclear pores, nucleoplasm, nucleolus, nucleosomes, DNA, histones, chromatin, and chromosomes.
- Compare and contrast passive versus active transport mechanisms.
- Differentiate between diffusion, osmosis, facilitated diffusion, filtration, primary active transport, secondary active transport, and vesicular transport.
- Define solute and solvent and describe their importance in the identification of the three types of tonicity and describe their effects on human cells.
- List the components of the cell life cycle and describe the key events occurring during each: Interphase, G_1, S, G_2, G_0, M, and cytokinesis.

- Describe the process of DNA replication occurring during S of interphase and apply the principles of complimentary base pairing.
- Describe the phases of mitosis: prophase, metaphase, anaphase and telophase.
- Name and describe the two phases of protein synthesis and discuss the roles of DNA, mRNA, rRNA, and tRNA, in each phase.
- Describe the processing of RNA before it leaves the nucleus and the importance of introns, exons, and spliceosomes in the process.
- Describe the role of the following on the process of replication and/or protein synthesis: helicase, DNA polymerase, RNA polymerase, promoter, terminator, codon, anti-codon, ribosome.
- Describe the formation of cancer and how it relates to cell division processes.
- Define the terms: mutation, tumor, apoptosis, benign, malignant, and metastasis.
- Define and differentiate between the terms: histology versus cytology.
- Name the three types of germ tissue and describe the adult tissues into which they differentiate.
- Name the four principle tissue types and briefly describe each.
- Describe the location and function of the various types of membranes of the human body.
- List the structural and functional characteristics common to all epithelial tissue.
- Describe how epithelial tissues are named and classified.
- Indicate the function, location, and description of the different types of epithelial tissue.
- Define the following: gap junctions, desmosomes, hemidesmosomes, adhesion belts, and tight junctions.
- Define gland and differentiate between endocrine versus exocrine as well as the different types of secretory classifications and structural classifications.
- List the common characteristics of all connective tissue.
- Be able to discuss the type of matrix and cell type associated with each type of connective tissue.
- Indicate the function, location, and description of the various types of epithelial tissue found within the body.
- Indicate the function, location, and description of the various types of connective tissue found throughout the body.
- Indicate the function, location, and description of the various types of muscle tissue found throughout the body.
- Indicate the function, location, and description of the various types of nervous tissue found throughout the body.
- Describe the various functions of skin.
- Name the types of tissues associated with the epidermis, dermis, and hypodermis.
- List the 5 major layers of epidermis and describe the functions and characteristics of each.
- List the 2 major areas of the dermis and describe the characteristics of each.
- Describe the factors that normally contribute to skin color.
- Compare the structure, location, and product of sweat glands versus oil glands.

- Compare and contrast the modified sweat glands including: eccrine, apocrine, ceruminous, and mammary glands.
- List the 4 different sensory receptors of skin and describe each.
- List the parts of a hair and follicle and explain the function of each part. Also describe the relationship of the arrector pili muscle relative to the hair follicle.
- Describe the structure and function of nails.
- Summarize the characteristics of the three major types of skin cancer and discuss the ABCDE Rule.
- Describe the different types of hormones that affect skin.
- Describe the various skin disorders discussed in class as well as the age-related changes that occur in skin.
- Define the following terms: strata, keratin, cyanosis, epidermal ridges, dermal papillae, cleavage lines, striae, cutaneous network, and melanosomes.
- List and describe five important functions of bones.
- Discuss the various classifications of bones with respect to location, shape, and consistency.
- Define the scientific terms for the various bone markings associated with articulation sites, muscle attachment sites, and openings or depressions.
- Describe the gross anatomy of long bones including: diaphysis, epiphysis, metaphysis, trabeculae, periosteum, endosteum, medullary cavity, epiphyseal line/plate, etc.
- Describe the histology of compact bone including: central canal, lacunae, canaliculi, lamellae, circumferential lamellae, interstitial lamellae, perforating canals, and osteons.
- Name and describe the 4 different cell types associated with bone.
- Discuss the organic and inorganic compositions of bone.
- Compare and contrast the mechanisms for the formation of long bones versus flat bones.
- Describe the process of bone growth in terms of length and width.
- Describe bone remodeling and repair processes.
- Name and explain how 2 hormones regulate a person’s blood-calcium levels relative to bone deposition and resorption.
- Describe the characteristics of the various bone disorders discussed in class.
- Discuss the different types of fractures and how they are classified.
- Name the major bones associated with axial versus the appendicular skeleton.
- Be able to indicate the number of bones in the adult skeleton and within various regions/structures of the body such as: skull, hands, feet, ribs, vertebrae, etc.
- Identify the bones and parts of bones that participate in articulations about the body.
- Name, describe, and identify the important markings associated with each of the major bones of the body.
- Define fontanels and indicate their significance in the fetal skull.
- Define joint or articulation.
- Define the following terms: synarthrotic, diarthrotic, and amphiarthrotic.
- Describe the structural and functional classification of joints.

- Describe the general structure of a fibrous joints.
- Give an example of the three types of fibrous joints and determine their functional classification.
- Describe the general structure of a cartilaginous joint.
- Give an example of the two types of cartilaginous joints and determine their functional classification.
- Name and describe the components associated with the general structure of a synovial joint.
- Describe the importance of synovial fluid and discuss its origins.
- Name and describe the common body movements provided by synovial joints such as flexion, extension, abduction, adductions, protraction, retraction, rotation, circumduction, etc.
- Name and provide specific examples of the six types of synovial joints and give an example of each.
- Describe the 4 types of axial movements and give an example of a joint that exhibits each type.
- Name the most common joint injuries and discuss the symptoms associated with each.
- Be able to list the basic characteristics and functions of muscle tissue.
- Be able to compare and contrast the 3 basic types of muscle tissue.
- Describe the gross structure of a skeletal muscle including its arrangement, connective tissue coverings, vascularization, and innervations.
- Describe the microscopic structure and functional roles of the various components of a muscle fiber (cell).
- Describe the design of a sarcomere with relation to the overlapping of actin and myosin fibers.
- Be able to describe the basic components of an actin and myosin myofilament.
- Describe the activity at the neuromuscular junction and the role of Ca+ and neurotransmitters.
- Describe the stimulation of a muscle cell from the resting membrane potential through depolarization, formation and propagation of an action potential, and repolarization.
- Explain the sliding filament theory being sure to discuss the role of Ca+, ADP+P, and ATP.
- Define a muscle twitch and describe the events occurring during its three phases.
- Differentiate between various types of muscle twitches discussed in class.
- Differentiate between isometric and isotonic contractions.
- Briefly describe three ways in which ATP is regenerated during skeletal muscle contraction.
- Define oxygen debt and muscle fatigue.
- Describe the characteristics of the muscle diseases/disorders described in class.
- Describe the function of a prime mover, antagonist, synergist, and fixator.
- List the criteria used in naming muscles and provide an example to illustrate each.

- Name the common patterns of muscle fascicle arrangement and provide an example to illustrate each.
- Name and describe the components of a lever system.
- Differentiate between a lever designed for speed versus power.
- Differentiate between a first class, second class, and third class lever and give an example of each.
- What 4 muscles make up the quadriceps?
- What 3 muscles make up the hamstring?
- What muscles are involved in chewing?
- What muscles are involved in inspiration? Expiration?
- What muscles flex the elbow? What muscles extend the elbow?
- What is the function of the following forearm muscles; extensor carpi ulnaris, flexor carpi ulnaris, flexor carpi radialis, extensor carpi radialis, pronator teres, & palmaris longus.
- What muscles control the voluntary movement of the eyeball?
- What are the 2 main superficial back muscles?
- What is the anatomical name for the calf muscle?
- What 4 muscles are found in the abdominal wall?
- What muscle is responsible for closing the mouth? Closing the eyelids? Sucking and whistling?
- List the basic functions of the nervous system.
- Explain the structural and functional divisions of the nervous system.
- List the types of neuroglia and cite of their functions.
- Define neuron, describe its structural components, and relate each to a functional role.
- Differentiate between a nerve and a tract as well as a nucleus and a ganglion.
- Explain the importance of the myelin sheath and describe how it is formed in the central and peripheral nervous systems.
- Classify neurons both structurally and functionally.
- Define resting membrane potential, depolarization, action potential, and repolarization and describe how each is achieved. Describe the mV associated with each phase.
- Differentiate between a graded potential and an action potential.
- Differentiate between saltatory propagation and continuous propagation of an action potential.
- Differentiate between passive channels versus gated channels as well as their location or distribution on the surface of a neuron, and their functions.
- Define synapse and distinguish between an electrical and chemical synapse both structurally and functionally.
- Define neurotransmitters, discuss their role in nerve impulses and name several classes of neurotransmitter discussed in class.
- Describe the anatomical structure of a spinal nerve.
- Relate the distribution pattern and functions of the cervical plexus, brachial plexus, lumbar plexus, and sacral plexus.
- Describe the major functions of the following nerves:

    - Phrenic nerve
    - Radial nerve
    - Ulnar nerve
    - Median nerve
    - Axillary nerve
    - Suprascapular nerve
    - Intercostal nerve
    - Femoral nerve
    - Obturator nerve
    - Saphenous nerve
    - Sciatic nerve
    - Pudendal nerve
    - Tibial nerve
    - Fibular nerve
    - Sural nerve
- Identify the number, function, and classification (sensory, motor, or mixed) of each of the following cranial nerves. Also provide or describe a disorder associated with each.
    - Olfactory nerve
    - Optic nerve
    - Oculomotor nerve
    - Trochlear nerve
    - Trigeminal nerve
    - Abducens
    - Facial nerve
    - Vestibulocochlear nerve
    - Glossopharyngeal nerve
    - Vagus nerve
    - Accessory nerve
    - Hypoglossal nerve
- Describe the sensory organs of smell, trace the olfactory pathways to their destinations in the cerebrum, and explain how olfactory perception occurs.
- Describe the sensory organs of gustation.
- Describe gustatory reception, briefly describe the physiologic processes involved in taste, and trace the gustatory pathway.
- Describe the structures of the external, middle, and inner ear, and explain how they function.
- Describe the structures and functions of the bony labyrinth and membranous labyrinth.
- Describe the functions of hair cells in the semicircular ducts, utricle, and saccule.
- Describe the structure and functions of the organ of Corti.
- Explain the anatomical and physiological basis for pitch and volume sensations for hearing.
- Trace the pathways for the sensations of equilibrium and hearing to their respective destinations in the brain.
- Identify the accessory structures of the eye and explain their functions.

- Describe the layers of the wall of the eye and the anterior and posterior cavities of the eye.
- Explain how light is directed to the fovea of the retina.
- Describe the process by which images are focused on the retina.
- Describe the structure and function of the retina's layers of cells, and the distribution of rods and cones and their relation to visual acuity.
- Explain photoreception; describe the structure of the photoreceptors; explain how visual pigments are activated; and describe how we are able to distinguish colors.
- Explain how the visual pathways distribute information to their destinations in the brain.
- Describe various accommodation problems associated with the cornea, lens, or shape of the eye.
- Describe age-related disorders of olfaction, gustation, vision, equilibrium, and hearing.
- List the divisions of the ANS and the general functions of each.
- Describe the structures and functions of the sympathetic and parasympathetic divisions of the autonomic nervous system.
- Describe the innervation patterns of the sympathetic and parasympathetic divisions of the autonomic nervous system.
- Describe the various types of sympathetic and parasympathetic receptors and their associated neurotransmitters.
- Describe the mechanisms of neurotransmitter release in the ANS and explain the effects of neurotransmitters on target organs and tissues.
- Discuss the relationship between the two divisions of the ANS and the significance of dual innervation.
- Define a visceral reflex and explain the significance of such reflexes.
- Explain the roles of baroreceptors and chemoreceptors in homeostasis.
- Describe the hierarchy of interacting levels of control in the autonomic nervous system beginning with the hypothalamus.
- Describe the mechanisms of intercellular communication and how the endocrine system and nervous system are similar yet different.
- Explain the classification of hormones and give an example of each class.
- Differentiate between positive and negative feedback and describe the interactions that might occur between hormones.
- Describe how the hypothalamus controls endocrine organs.
- Describe the location and structure of the pituitary gland, and identify the various pituitary hormones and their functions.
- Describe the location and structure of the thyroid gland, identify the hormones it produces, and specify the functions of each of those hormones.
- Describe the location of the parathyroid glands, and identify the functions of the hormones they produce.
- Describe the location, structure, and general functions of the adrenal cortex and adrenal medulla, identify the hormones produced by the adrenal cortex and the adrenal medulla, and specify the function of each hormone.

- Describe the location and structure of the pancreas, identify the hormones it produces, and specify the functions of those hormones.
- Describe the location of the pineal gland and identify the function of the hormone it produces.
- Describe the functions of the hormones secreted by the kidneys, heart, skin, adipose tissue, ovaries, testes, gastrointestinal tract, skeleton, liver, and thymus gland.
- Describe the key endocrine disorders associated with Hypersecretion or hyposecretion of the endocrine hormones.

Additionally, you should be reviewing the following items . . .

- Course Textbook; Chapters 1-16
- Course Supplement; Modules 1-16
- A & P Labs 1-12
- Hole's Anatomy & Physiology; Chapters 1-13
- Anatomy & Physiology (McKinley text); Chapters 1-17
- Principles of Anatomy & Physiology (Tortora text); Chapters 1-18
- Seeley's Anatomy & Physiology; Chapters 1-18

Also, be sure to take a look at the links and resources on Canvas and my lecture and laboratory webpage. ***This study guide covers the majority of information on the lecture exam, but possibly not all of it. You are still responsible for any information that was covered but not put on this study guide (intentionally or unintentionally). Good Luck and Study Hard!!!***