Students should be able to:

- Define Anatomy and Physiology
- Be able to list and explain the levels of structural organization.
- Be able to list and define the various characteristics of a living entity.
- Be able to define and provide examples of positive and negative feedback.
- Define homeostasis.

Clinical Application: Medical Imaging

- Be able to define various anatomical positional AND directional terms.
- Be able to define various body planes.
- Be able to label the 9 regions of the tic-tac-toe diagram model.
- Know the body cavities and the structural components within them.
- Define: mediastinum, diaphragm, peritoneum (the 3 types), and mesentery.

- Be able to name the various body systems and components within them.
- Be able to name the elements found in many organic chemicals.
- Know the atomic structure/subatomic particles.
- Define isotopes and their importance.
- Explain the role of ions and free radicals/antioxidants in A&P.

- Know the various types of chemical bonds.
- Identify properties of water.
- Know the properties of various types of mixtures.
- Be able to apply the concepts of pH, acidity, and concentration to A&P
  - Example: Effect of pH on enzymes.
- Know types of reactions and factors that affect reaction rates.

- Understand the polarity of biological molecules.
- Understand the functions and structural organization of nutrients:
  - Carbohydrates – glucose, glycogen, cellulose, and starch.
  - Lipids: Saturated vs. Unsaturated Fats - Oils
- Phospholipids
- Steroids
- Triglycerides
- Fat soluble Vitamins
  - Proteins – Structure vs. Function with Enzymes
- Nucleic Acids: DNA and RNA Enzymes
- ATP
- Cofactors/Coenymes

Identify and state function of various cell parts:
• (Be able to distinguish Plant and Animal cells)
• Nucleus - Chromosomes (Chromatin)
• Ribosome
• Endoplasmic Reticulum (ER): Rough ER vs. Smooth ER
• Golgi Apparatus
• Lysosome and Inclusions (Vacuoles)
• Mitochondria
• Plasma (Cell) Membrane
• Membrane Proteins – Their various functions.
• Cytoskeleton

Define and explain various forms of active and passive transports:
- Diffusion
- Osmosis (tonicity)
- Sodium/Potassium Pump
- Facilitated Diffusion
- Exocytosis
- Phagocytosis
- Pinocytosis
- Filtration

• DNA Structure and Function - Identify the elements that comprise a nucleotide.
• Chromosome – Structure and Function
• Define gene -various definitions.
• State differences between DNA and RNA –structure and function.
• Be able to use the genetic code.
• Explain the value of the genetic code and how the nitrogenous bases play a role.

• Explain the process/elements involved in DNA Transcription and RNA Translation.
• Explain the process/elements involved in DNA Replication.
• Define and explain Mitosis/Meiosis.
• Identify and explain the actions taking place in various phases of mitosis: interphase, prophase, metaphase, anaphase, telophase, and cytokinesis.
• State differences between meiosis and mitosis.

• Be able to state the phases and importance of the cell cycle.
• Be able to state the importance of a mutation.
• Define karyotype.
• State the steps for carcinogenesis.
• State the features of a cancer cell.

Define and know the features/functions of the 4 major tissue types (with glands):

Epithelial Tissue:
• Types of Membranes and their Definitions: Mucous, Serous, Synovial and Cutaneous
• Connective Tissues/Fibers: Cartilage, Bone, Blood, Adipose, Dense, Loose
• Muscle Tissue: voluntary and involuntary; smooth, cardiac, and skeletal
• Nerve Tissue: neurons and neuroglia
• Glands: sudoriferous, sebaceous, ceruminous – types of exocrine glands.

• Define the three main intercellular junctions.
Types of tissue growth/differentiation/atrophy/death.

Structure and Function for Skin:
- Epidermal, Dermal, Hypodermal Structures.
- What is keratin and keratized epithelium?
- Know the features of each Strata of the Epidermis:
  - stratum corneum
  - stratum lucidum
  - stratum granulosum
  - stratum spinosum
  - stratum germinativum/basale (mitotic layer)

Clinical Application:
Transdermal Absorption, Dust Mites, and Skin Coloration (Body Disorders)

Skin Markings
- Structure of Hair/Follicle
- Define/State function for: Sebaceous and Sudoriferous Glands.
- Skin Cancer – ABCD
- Skin Burns – 1st, 2nd, and 3rd degree Features and Rules of Nines.

Structure and Function for Skeletal System:
- Know the Bone Shapes/Types of Bones
- Define and explain the actions for: Osteocytes/Osteoblasts/Osteoclasts.
- Compare spongy vs. Compact bone.
- Know the axial versus appendicular bones.
- Know the number of bones in the body.

- Know the names of all the bones and numbers of each type (including numbers and types of vertebrae, names and numbers of cranial bones, and facial bones).
- Know bone surface features.
- Know differences in male/female bone surface features.
- Types of Ossification
- Bone Growth and Remodeling

Hormonal control of bone and mineral homeostasis
Classification of bone fractures and bone diseases.
Classification/Types of joints.
Special Movements.

Clinical Application: TMJ, ACL, Bunion, and Arthritis

Structure and Function for Muscles:
- Know the structural organization:
  - muscle, muscle cell, myofibril, myofilament, and sarcomere.

Muscle attachment and actions:
- Prime Mover, Synergist, Agonists, Antagonists
- Classification of Muscles as Flexors, Extensors, Abductors, Adductors
- Naming of Muscles Related to location, origin, insertion, shape, function (action)
  - Electrochemical stimulation/innervation of muscles.
• Explain the Sliding Filament Theory of Muscle Contraction.
• Structural roles of: actin, myosin, ATP, and calcium.

• Muscle Types: - Voluntary versus Involuntary versus Cardiac.
• Know the names of all major contour (surface) muscles.
• Terms to Know: Joint, Tendon, Ligament, Sarcoplasmic Reticulum
• Explain muscle contraction and relaxation
• How do toxins affect the NMJ? Name various mode of action.
• Explain temporal summation.
• Types of muscle fibers- Properties.
• Muscle metabolism.

Clinical Application: Disuse/Denervation Atrophy and Curare.

• Structure and Function for Nervous System and Nerves:
• Central Nervous vs. Peripheral Nervous System
• Properties and Anatomy of Neuron
• Neural Conduction and Factors that affect speed.
• Types of Neuroglia
• Sensory (afferent) vs. Motor (efferent) Neurons

• Resting Membrane Potential – Factors that alter and maintain RMP.
• Local vs. Action Potential
• Somatic (Voluntary) vs. Autonomic Nervous System
• Types/Actions of neurotransmitters
• Define memory and its structural component.
• Types of memories

Clinical Application:
Alzheimer, Parkinson, Spina Bifida, Shingles, Polio, Hydrocephalus and ALS.

Spinal Cord and Spinal Nerves: Structure/Function
- Simple spinal reflexes versus modified by ascending and descending tracts.
- Sensory versus motor impulses
- Dorsal horns versus ventral horns
- Definitions: foramen magnum, spinal (vertebral) column
- Meninges of Spinal Cord
- Plexuses
- Reflexes
- Importance of Dermatomes.

Major/Minor parts of the Brain and their Functions.
- Lobes: Functions/Lesions
- Gray vs. White matter
- Meninges – Parts/Division
- Choroid Plexus – CSF – Functions
- BBB and its importance.
- Role of Reticular Formation
- Role /Parts of Limbic System
- EEG and Sleep
- Interaction of frontal lobe/limbic area
- Language Sensory/Motor
- Cerebral Sidedness
- Cerebral Areas – Association
- Cranial Nerves – Actions and Naming (Roman Numbers)
- Parasympathetic NS vs. Sympathetic NS
- Receptors – types.

Parts/Function of Ear
- Properties of Sound
- Process of hearing
- Types of Deafness
- Process of Balance
- Types of Balance – Static/Dynamic

Clinical Application: Otitis Media and Cerebellar Ataxia

Parts/Function of Eye
- Movement of Eye
- Formation of image - Refraction
- Near response – Convergence, Constriction of Pupil, and Accommodation
- Common Eye Defects – Explanation and Correction

Clinical Application: Lasik Repair, Bifocals, and Astigmatism

- Sensory transduction using Rods/Cones
- Action of Rods/Cones
- Color-Blindness
- 3D Vision
- Visual Pathway into Brain
- Dual Visual System – color and contrast – scotopic and photopic system