Anatomy Nervous System Learning Objectives

Neuron Anatomy and Physiology
- Classify the nervous system into central and peripheral divisions and subdivide the peripheral system into somatic, autonomic, sympathetic and parasympathetic systems
- Distinguish between neurons and neuroglia
- List the neuroglia and their functions
- Classify the types of neurons by their function
- Describe the structures of a typical neuron and their functions
- Discuss the relationship between the presence of a neurilemma and nerve repair
- Explain membrane potential and how a membrane potential is developed
- Define resting potential, action potential, threshold, depolarization, repolarization, hyperpolarization, and refractory period
- Describe the all or none principle
- Explain the propagation of an action potential
- Compare conduction in myelinated and unmyelinated nerve fibers
- Define a synapse and describe its structure
- Describe the release of chemical transmitters, their binding at the receptor sites and their inactivation
- Describe the effect of excitatory and inhibitory neurotransmitters on the post-synaptic membrane
- Explain synaptic delay, summation, facilitation, and synaptic fatigue
- List several inhibitory and excitatory neurotransmitters and neuropeptides

Spinal Cord and Nerves Anatomy and Physiology
- State the functions of the spinal cord
- Describe the gross anatomy of the spinal cord and spinal nerves
- Describe the structure of the spinal cord (in cross section) and spinal nerve roots and state the functions of gray and white matter
- Describe the protective coverings of the spinal cord
- Explain why spinal nerves are mixed nerves
- Review the branches of a spinal nerve and the regions they supply
- Explain the formation of plexi by ventral rami, list their names and the regions they innervate
- Identify the major nerves of the body (ex. sciatic, phrenic, etc.)
- Define a reflex action and state its importance
- Define visceral, somatic, cranial and spinal reflexes
- Explain somatic muscle reflexes and list some examples
- Define and give examples of monosynaptic, polysynaptic, ipsilateral and contralateral reflexes
- Identify the cranial nerves and briefly state their functions
Brain Anatomy and Physiology

- Describe the protective coverings of the brain
- List the four principal divisions of the brain and briefly state their functions
- Describe the gross anatomy of the brain; identify the major brain structures visible externally and in mid-sagittal section
- Explain the formation and circulation of cerebrospinal fluid
- Define hydrocephalus
- Describe the concept of the blood-brain barrier
- List the regions of the brainstem and briefly explain their functions
- List the structures of the diencephalon and briefly explain their functions
- Briefly explain the functions of the cerebellum
- Explain the functions of the white and gray matter of the cerebrum
- Describe how the cerebral cortex is divided into functional areas and briefly explain their functions
- Describe the structure and function of the limbic system and reticular formation
- Briefly explain how an EEG is produced and its uses
- Differentiate between lower motor neurons and higher motor neurons
- Describe the neural pathways involved in the pyramidal and extrapyramidal tracts
- Compare the sympathetic and parasympathetic divisions of the autonomic nervous system in terms of: outflow from CNS location of autonomic ganglia formation of plexi relative length of pre- and postganglionic neurons
- Compare the sympathetic and parasympathetic divisions in terms of their neurotransmitters and their effects on visceral effectors
- Describe the "fight-or-flight" reaction

Special Senses

- Name the different sensory receptors
- Describe the neural pathways for cutaneous sensations and proprioception
- Analyze the components and processes of the body's special senses.
- Identify and describe the structure and function of each of the following: fibrous coat (sclera & cornea), vascular coat (choroid, ciliary body & iris), retina (rods & cones), lens anterior and posterior cavities aqueous and vitreous humor
- Describe retinal image formation (include refraction, accommodation, constriction of pupil, convergence and inverted image formation)
- Define emmetropia, myopia, hyperopia, astigmatism, cataract, glaucoma and color blindness
- Name the three anatomical divisions of the ear
- Describe briefly the structure and function of each of the following: external ear and ear canal (meatus), middle ear (ossicles, tympanic membrane, eustachian tube), inner ear (bony labyrinth, membranous labyrinth and fluid), vestibule, utricle, saccule, semicircular canals, cochlea
- Name the receptor organs for equilibrium and hearing
- Compare static and dynamic equilibrium
- List the sequence of steps involved in the physiology of hearing