

HUMAN ANATOMY & PHYSIOLOGY I - BIO 223

Lecture Course Objectives

Saladin Text (*Note there is considerable overlap with the material in the lab objectives*)

Chapter 1 and Atlas A: Major Themes of Anatomy & Physiology: Orientation

1. Define anatomy and physiology. Explain how they are related and the subdivisions of each.
2. Name the levels of structural organization in the human body and explain their relationships.
3. Understand the location of and organs contained in the major body cavities (open and closed) covered in lecture.
4. Be able to name and locate and describe the structure of the 3 different types of epithelial (serous) membranes of closed body cavities (pericardial, pleural and peritoneum).
5. Be able to describe the anatomical position.
6. List and describe the major requirements of life.
7. List and describe the major functions or characteristics of life.
8. Define metabolism.
9. Define homeostasis, explain its importance, and describe the relationship between homeostasis and disease.
10. Define positive and negative feedback mechanisms and describe their relationship to homeostasis.

Chapter 4: Histology

1. Define the term "tissue". Identify or list four general types of tissues in the body and give the function of each.
2. State the body regions, structural characteristics and functions for each of the epithelial types listed below.
 - simple squamous
 - simple cuboidal
 - simple columnar
 - pseudostratified columnar
 - stratified squamous
 - stratified cuboidal
 - stratified columnar
 - transitional
3. State body regions and structures for each of the following membrane types:
 - serous membranes
 - mucous membranes
 - synovial membranes
 - cutaneous membranes
4. Name and know the functions of the three structural elements of connective tissue.
5. State a body region or structure for each of the connective tissue types listed below.
 - loose connective tissue
 - areolar
 - adipose

- reticular
 - dense regular connective tissue (fibrous connective)
 - dense irregular connective tissue
 - hyaline cartilage
 - elastic cartilage
 - fibrocartilage
 - bone (compact & spongy)
 - blood
6. Give an example of cell types commonly found in the various types of connective tissues and list a function for each cell type.
 7. List and identify the three major types of muscle tissue. Give an example of where each is found.
 8. Describe the characteristics and functions of nervous tissue (also see chapter 12, pp442-452).
 9. Explain the structural and functional divisions of the nervous system (also see chapter 12, pp442-452).
 10. Describe and identify the structural components of a neuron and give the function of each (also see chapter 12, pp442-452).
 11. Understand the secretory processes of these glands:
 - Apocrine
 - Merocrine
 - Holocrine
 - Goblet cells

Chapter 7: Bone Tissue

1. List and describe the major functions of bone.
2. Identify the different shapes of bones and give examples of each--long, short, irregular, and flat.
3. Compare the histology of compact and spongy bone.
4. Describe the process of long bone growth that occurs at the epiphyseal plate.
5. Explain hormonal control of bone deposition and resorption. What are normal blood calcium levels; what are the recommended levels of calcium in the diet?
6. Describe and the cause of the following bone disorders:
 - Osteoporosis
 - osteomalacia
 - dwarfism
 - gigantism
 - rickets
 - acromegaly
 - Paget's disease.
7. Identify and state the function of the Haversian system with its constituents:
 - Osteon
 - central (Haversian) canal
 - Lacunae
 - canaliculi
 - Perforating (Volkmann's) canals
 - Lamella

- Osteon
 - Sharpey's fibers
8. Identify a sagittal section of a bone including the following structures:
- Periosteum
 - compact bone
 - spongy or cancellous bone
 - diaphysis
 - epiphysis
 - epiphyseal plate
 - hyaline cartilage
 - medullary cavity
9. Be able to describe and define the following:
- osteocyte
 - osteoblast
 - osteoclast
 - hemopoietic tissue
 - fontanel
 - articulation
 - ligament
10. Know the various functions of the skeletal system.
11. Describe the two kinds of bone marrow, give the function of each and where each is found in the child and adult.
12. Describe intramembranous and intracartilaginous (endochondral) ossification.
13. Identify synarthroses, diarthroses, and amphiarthroses (see laboratory objectives).
14. Identify the three factors that stabilize joints.
15. Describe synovial fluid and the synovial joint.
16. Describe the structure and function of the bursa.
17. Be able to classify movable joints into the correct category according to the type of movement at the joint

Chapter 9: Joints

1. Classes of Joints
- Synarthroses
 - amphiarthroses
 - diarthroses
2. Kinds of Joints
- ball and socket
 - hinge
 - condyloid
 - pivot
 - saddle
 - gliding
3. Angular Movement
- flexion

- extension
- rotation
- circumduction
- pronation
- supination
- abduction
- adduction
- hyperextension

Chapter 6: Integumentary System

1. Explain the general functions of skin.
2. Describe the layers of the epidermis, the kinds of cells found in the epidermis, the specialized proteins of these cells and the function of those cells.
3. Describe the structure and function of the dermis.
4. Describe the accessory structures and glands associated with the skin and state the general functions of each.
5. Describe the following functions of skin:
 - thermoregulation
 - protection
 - sensory
 - synthetic
 - mechanical
 - blood reservoir
 - excretion
6. Summarize the factors that determine skin color.
7. Know how burns are classified – 1st, 2nd and 3rd degree.
8. Explain the effect of serious burns. Describe how the rule of nines and degree of burn is used to determine the seriousness of the burn.
9. Know and be able to describe the three types of skin cancer. Know which one is the most dangerous.
10. Define the “ABCDE” rule of skin cancer.

Chapter 12: Nervous Tissue

1. List the basic function(s) of the nervous system.
2. Explain the structural and functional divisions of the nervous system.
3. Describe and identify the structural components of a neuron and give the function of each
4. Describe and identify the following characteristics of neurons:
 - threshold
 - resting membrane potential (polarized state)
 - depolarized state
 - repolarization
 - refractory period
5. Describe substances which are acting as chemical transmitters at a synapse or neuron junction and explain the action of each one.
6. Describe or identify the following properties of a synapse:

- facilitation
 - temporal summation
 - spatial summation
 - fatigue
 - inhibition
7. Describe the principle steps in the origin and conduction of a nerve impulse.
 8. List the types of supporting cells of the nervous system and give the function of each.
 9. Describe the function of myelin sheath and explain how it is formed in the PNS and CNS. What cell types actually form the myelin sheath in the PNS and CNS.
 10. Classify neurons structurally and functionally.
 11. Differentiate between a nerve and a tract. Differentiate between a nucleus and a ganglion.
 12. Define the resting membrane potential and describe its electrochemical basis.
 13. Compare and contrast graded and action potentials.
 14. Explain how action potentials are generated and propagated along neurons.
 15. Define absolute and relative refractory periods. What function does the absolute refractory period serve? The relative refractory period?
 16. Define saltatory conduction and contrast it to conduction along unmyelinated fibers.
 17. Define synapse.
 18. Distinguish between electrical and chemical synapses both structurally and in their mechanisms of information transformation.
 19. Describe in detail the structure and function of a chemical synapse.
 20. Distinguish between excitatory and inhibitory postsynaptic potentials.
 21. Describe how synaptic events are integrated and modified.
 22. Describe common patterns of neuron organization and neuronal processing.

Chapters 10 & 11: The Muscular System & Muscular Tissue

1. State the primary and most immediate chemical source of energy for muscle contraction (pages 425-428. See also chapter 26, pages 1025-1032).
2. Describe the pathways that provide ATP for a contracting muscle fiber (pages 425-428. See also chapter 26, pages 1025-1032). In what order are these pathways activated?
3. Describe the production and subsequent fate of lactic acid in a fatigued muscle. Define oxygen debt and muscle fatigue. List possible causes of muscle fatigue. (pages 425-428. See also chapter 26, pages 1025-1032).
4. Compare the anatomy and physiology of skeletal, cardiac and smooth muscle in terms of the following characteristics.
 - striated/ non-striated
 - voluntary/ involuntary innervations
 - mechanism of contraction
 - proteins involved in contraction
 - size
 - location
 - role of calcium in contraction
 - channel types associated with an action potential
5. Know the three layers of connective tissue that surround muscle; what layer does the tendon connect to?

6. Describe and identify the following characteristics of neurons:
 - threshold
 - polarized state
 - depolarized state
 - repolarization
 - refractory period
7. Describe substances which are acting as chemical transmitters at a synapse or neuron junction and explain the action of each one.
8. Know the location and function of the following components of the neuromuscular junction:
 - synaptic vesicles
 - synaptic cleft
 - motor end plate
 - junctional folds (invaginations) of motor end plate
 - neurotransmitter
 - acetylcholine
 - acetylcholinesterase
 - receptor operated channels
 - voltage operated channels
9. Be able to define:
 - resting membrane potential
 - depolarization
 - repolarization
 - hyperpolarization
10. Know the difference between the following:
 - receptor operated (chemically gated) channels
 - voltage operated (voltage gated) channels
 - stretch-activated channels
11. Know the intracellular and extracellular physiological concentrations of K^+ , Na^+ and Ca^{2+} . Know which way these ions flow through the above channel types.
12. Be able to predict whether a particular ion's flow results in depolarization, repolarization or hyperpolarization.
13. Locate and describe the microscopic structure and functional roles of the following parts of a muscle fiber.
 - muscle fiber
 - myofibrils
 - myofilaments
 - thin filaments
 - actin
 - G actin
 - F actin
 - tropomyosin
 - troponin – TnI, TnT, TnC
 - thick filaments
 - myosin

- myosin tail
 - myosin head
 - sarcoplasmic reticulum
 - foot proteins
 - Ca²⁺ channels
 - Ca-ATPase
 - T tubules
 - terminal cisternae
 - triads
 - A band
 - I band
 - H zone
 - M line
 - Z line
 - fascicle
 - sarcomere
14. Know and understand the Sliding Filament Theory of Muscle Contraction.
 15. Be able to draw and explain the basis of the length tension curve.
 16. Explain how graded contractions of skeletal muscle are produced.
 17. Define muscle twitch and describe the physiological events.
 18. Describe the factors that influence the force, velocity, and duration of skeletal muscle contraction.
 19. Name and describe types of skeletal muscle fibers (fast, slow and intermediate) and how their function relates to their energy producing pathways.
 20. Compare and contrast the gross and microscopic anatomy of smooth muscle cells to skeletal muscle cells.
 21. Compare and contrast the contractile mechanisms and the means of activation of skeletal and smooth muscles.

Chapter 13: The Spinal Cord, Spinal Nerves and Somatic Reflexes

1. Define peripheral nervous system and list its components.
2. Describe the function of the descending and ascending tracts of the spinal cord.
3. Describe the anatomical relationship between the spinal cord, the vertebral column and the meningeal layers.
4. Label a spinal nerve and state the function of each of the following:
 - dorsal root
 - dorsal root ganglia
 - ventral root
5. Know and be able to define the three levels of neural integration of the somatosensory system.
6. Know and be able to define the three levels (motor hierarchy) that control neural integration of the motor system.
7. Distinguish between sensory, motor and mixed nerves.
8. Define ganglion and indicate the general location of ganglia in the body.
9. Define nerve and describe the general structure of a nerve.
10. Explain how a nerve regenerates. Under what circumstances would regeneration occur? Under what circumstances would regeneration not occur?
11. What are the five components of a reflex arc?

12. Describe the events of a stretch reflex.
13. How does a muscle spindle react to muscle stretch? To muscle contraction?
14. Describe these reflexes:
 - Golgi (Deep) tendon
 - Flexor
 - Crossed Extensor
 - Plantar
 - Abdominal
15. List the five types of sensory receptors in the body.
16. Define sensation and explain what is meant by sensory adaptation.
17. Name the 5 subdivisions of the spinal nerves and state the number of nerves within each.
18. Describe the levels of the motor control hierarchy.
19. Define ataxia and explain how and why it occurs.

Chapter 14: Brain & Cranial Nerves

1. Describe the embryonic tissue layers from which the central nervous system differentiates.
2. Name the major regions of the brain and know their functions.
3. Define the term ventricle and indicate the location of the ventricles of the brain.
4. Know the major lobes, fissures, and functional areas of the cerebral cortex.
5. Differentiate between commissures, association, and projection fibers.
6. State the general function of the basal nuclei.
7. Know the location of the diencephalon and name the subdivisions.
8. Know the three major regions of the brain stem and give the function of each.
9. Describe the structure and function of the cerebellum.
10. Know the location and function of the limbic system and the reticular formation.
11. Describe how meninges, cerebrospinal fluid, and the blood-brain barrier protect the CNS.
12. Describe the formation of cerebrospinal fluid and follow it's circulation.
13. Briefly describe the pathology of the following degenerative brain disorders: Alzheimer's disease, Parkinson's disease and Huntington's disease.
14. Name the arteries which supply blood to the brain and state how venous blood is drained from the brain (see chapter 20).
15. Name and be able to describe the two major types of sleep.
16. Define EEG and be able to identify and functionally distinguish alpha, beta, theta, and delta waves.
17. Compare and contrast sleep patterns of infants, middle aged and older adults.
18. What are the effects of sleep deprivation?
19. Compare and contrast:
 - Consciousness
 - Syncope
 - Coma
 - Brain Death
20. Explain the function of the cerebellum and basal nuclei in somatic sensory and motor integration.
21. Number (using Roman numerals) & name each of the cranial nerves.

Note for memory objectives see also chapter 12 (pages 472-475)

22. Name the stages of memory.
23. Name four factors that help information move from short term to long term memory?
24. What are the two categories or types of memory?
25. What areas of the brain are involved in memory?
26. How are calcium & NMDA receptors involved in memory?

Chapter 15: The Autonomic Nervous System

1. Compare the somatic and autonomic nervous systems relative to effectors, efferent pathways, and neurotransmitters released.
2. Compare and contrast the general functions of the parasympathetic and sympathetic divisions.
3. Give examples of the antagonistic effects of the sympathetic and parasympathetic division of the autonomic nervous system.
4. Give the sympathetic response for each of the following body parts.
 - iris of the eye
 - lungs
 - kidneys
 - sweat glands
 - heart
 - liver
 - intestine
 - adrenal glands
 - urinary bladder
 - blood vessels
5. Describe how the hypothalamus controls and integrates the autonomic nervous system.
6. Define cholinergic and adrenergic fibers.
7. What are the two types of cholinergic receptors?
8. What are the two major classes of adrenergic receptors?
9. Describe the body's physiologic response to stress.
10. What is meant by referred pain? What causes referred pain?

Chapter 16: Sense Organs

1. List the anatomical parts of the eye and explain the function of each.
2. Explain how light is refracted by the eye.
3. Trace the pathway of light through the eye to the retina, and explain how light is focused for distant and close vision.
4. Describe the physics of light.
5. What are the roles of the visual pigments.
6. Describe the role of vitamin A in vision.
7. Describe in detail the events involved in the stimulation of photoreceptors by light, and the eventual generation of generation of an action potential in the ganglion cells.
8. Compare and contrast the the behavior of the photoreceptors in the light and the dark.
9. Compare and contrast the roles of rods and cones in vision.

10. Trace the visual pathway to the optic cortex, and briefly describe the process of visual processing.
11. Describe the structure and general function of the outer, middle, and inner ears.
12. Describe the sound conduction pathway to the fluids of the inner ear, and follow the auditory pathway from the Organ of Corti to the temporal cortex.
13. Describe the physics of sound energy and explain how it is converted to an action potential by the ear.
14. Explain how one is able to differentiate pitch and intensity of sound.
15. Distinguish between static and dynamic equilibrium, and explain how a sense of balance is maintained.
16. Identify the receptors for touch, pressure, thermoreception, pain, stretch, and chemoreception.
17. List the five basic taste groups.
18. Describe the process and the steps in taste transduction - i.e. the steps of how the chemical signal is transduced into a signal which is received by the brain.
19. Describe the seven primary odors.
20. Describe the process and the steps in smell transduction - i.e. the steps of how the chemical signal is transduced into a signal which is received by the brain.

Laboratory Course Objectives

Saladin Text (*Note there is considerable overlap with the material in the lecture objectives*)

For lab safety see handout given first day of lab.

Body Architecture & Organ Systems

Use your textbook, lab manual and the Anatomy Coloring Book as references.

1. Define and identify with respect to a model or diagram the following directional terms:
Superior
 - cranial
 - inferior
 - caudal
 - anterior
 - ventral
 - proximal
 - posterior
 - dorsal
 - medial
 - lateral
 - distal
 - superficial
 - deep
2. Define and identify with respect to a model or diagram the following body planes:
 - coronal or frontal
 - sagittal
 - transverse or horizontal
 - midsagittal
3. Be able to describe the anatomical position.
4. Identify and describe the body cavities, organs of, and structural limits of the following regions and cavities with respect to a model, diagram or the cadaver:
 - right and left hypochondriac regions
 - right and left lumbar regions
 - right and left iliac regions
 - epigastric region
 - hypogastric region
 - umbilical region
 - ventral cavity
 - spinal cavity
 - abdominal cavity
 - dorsal cavity
 - cranial cavity

- thoracic cavity
 - pelvic cavity
 - pericardial cavity
 - pleural cavity
 - peritoneal cavity
5. Use the terms listed in objective 1, 2, and 3 above to describe the region in which a given body structure is found. Describe the relative position of any two given body structures with respect to each other.
 6. List the 11 organ systems of the body, briefly explain their function, and list major organs found in each.
 7. Describe the anatomical position.
 8. Name the 3 serous membranes.
 9. Describe structures of the axial and appendicular areas of the body.

The Microscope

1. Be able to identify and know the function of these parts of the microscope
 - Ocular eyepieces
 - Objective lenses
 - Scanning lens (X4 objective lens)
 - Stage
 - Arm
 - Base
 - Iris diaphragm
 - Condenser
 - Substage light
 - Fine focus adjustment knob
 - Coarse focus adjustment knob
2. Know the procedure for examining a specimen slide using the 40X objective.
3. Be able to define:
 - Real image
 - Virtual image
 - Total magnification
 - Resolving power
 - Field
4. Understand the relationship between the power of the objective to the magnification of the specimen examined. When switching to a higher power, do you see more or less of the specimen?

Tissues

Use your textbook, lab manual and the Anatomy Coloring Book as references.

1. Be able to identify under a microscope and describe the appearance of each of the following types of epithelium. Be able to make labeled drawings of all these membranes and list an example of where they would be found with their function:
 - simple squamous
 - stratified squamous

- simple cuboidal
 - stratified cuboidal
 - transitional
 - simple columnar
 - pseudostratified columnar
 - ciliated pseudostratified columnar
 - stratified columnar
 - ciliated columnar
2. Be able to identify under a microscope and describe the appearance of each of the following types of connective tissue. Be able to make labeled drawings of all these tissues and list an example of where they would be found with their function:
- loose connective tissue
 - dense regular connective tissue (white fibrous connective)
 - dense irregular connective tissue
 - hyaline cartilage
 - elastic cartilage
 - fibrocartilage
 - adipose tissue
 - areolar tissue
 - reticular connective
 - bone (compact and spongy)
 - blood
3. Be able to identify the three major types of muscle tissue using a microscope (skeletal, cardiac and smooth).
4. Be able to identify nervous tissue presented in lab using a microscope.
5. Explain the structural and functional divisions of the nervous system.
6. Using models, slides & diagrams describe and identify the following structural components of a neuron and give the function of each:
- Cell body with nucleus
 - Dendrites
 - Axon
 - Axon Hillock
 - Synapses (also known as axonal terminals)
 - Myelin sheath
 - Nodes of Ranvier
7. List the types of supporting cells of the nervous system and give the function of each.
8. Describe the function of myelin sheath and explain how it is formed in the PNS and CNS. What cell types actually form the myelin sheath in the PNS and CNS.
9. Be able to draw simple labeled diagrams of ALL OF THE ABOVE TISSUES & list in the body examples of where they may be found.

Skeletal System

Use your textbook, lab manual and the Anatomy Coloring Book as references.

From diagrams, models, slides, and articulated/disarticulated skeletons be able to identify the following structures:

Descriptive Terms:

- head
- condyle
- crest
- spine
- tubercle
- tuberosity
- foramen
- sinus
- meatus
- trochanter
- fossa
- fissure
- sulcus

Classes of Joints:

- synarthroses
- amphiarthroses
- diarthroses

Kinds of Joints:

- ball and socket
- hinge
- condyloid
- pivot
- saddle
- gliding

Angular Movements:

- flexion
- extension
- rotation
- circumduction
- pronation
- supination
- abduction

- adduction
- hyperextension

Know the following Parts of the Axial Skeleton

Skull:

- frontal (including the zygomatic process of the frontal)
- parietal
- temporal
- external auditory (acoustic) meatus
- mastoid process
- zygomatic process of the temporal
- mandibular fossa
- styloid process
- zygomatic
- temporal process of the zygomatic
- frontal process of the zygomatic
- maxilla
- inferior nasal concha
- nasal
- occipital
- occipital condyles
- sphenoid
- sella turcica
- greater and lesser wings
- ethmoid
- cribriform plate
- crista galli
- perpendicular plate
- middle nasal concha
- palatine bone
- mandible
- body
- coronoid process
- mandibular condyle (condyloid process)
- ramus
- lacrimal bone
- vomer
- hyoid bone
- temporomandibular joint

Know the following Foramen of the Skull:

- optic canal
- foramen rotundum
- foramen ovale
- foramen spinosum
- jugular foramen
- carotid canal
- foramen lacerum
- foramen magnum
- mental foramen
- supraorbital foramen
- infraorbital foramen
- superior orbital fissure
- inferior orbital fissure
- hypoglossal canal
- stylo mastoid foramen
- greater palatine foramen

Know the following Sinuses

- frontal
- maxillary
- sphenoid
- ethmoid

Know the following Sutures

- squamous
- coronal
- lambdoidal
- occipitomastoid
- sagittal

Know the following Parts of the Sternum

- Manubrium
- body
- xiphoid
- process
- jugular notch

Know the following Parts of the Vertebral Column

- Atlas
- axis

- dens (=odontoid process)
- cervical vertebrae
- thoracic vertebrae
- lumbar vertebrae
- sacrum
- coccyx
- intervertebral disc
- body of vertebrae
- pedicle
- lamina
- spinous process
- transverse process
- vertebral foramen
- intervertebral foramen
- transverse foramen
- nucleus pulposus
- superior articular surface
- inferior articular surface

Ribs

- true
- false
- floating
- head
- neck
- tubercle
- angle
- shaft

Know the following Parts of the Appendicular Skeleton

Shoulder girdle:

- clavicle
- acromial end
- sternal end
- scapula
- spine
- glenoid cavity
- coracoid process
- acromion
- borders (lateral, medial, superior)
- supraspinous fossa

- infraspinous fossa

Upper Arm:

- humerus
- head
- greater tubercle
- lesser tubercle
- olecranon fossa
- coronoid fossa
- radial fossa
- capitulum
- trochlea
- medial epicondyle
- lateral epicondyle

Forearm:

- ulna
- olecranon process
- trochlear notch
- coronoid process
- styloid process
- head
- radius
- styloid process
- head
- neck
- radial tuberosity

Wrist and hand

- carpals
- trapezium
- trapezoid
- capitates
- hamate
- scaphoid
- lunate
- triquetral
- pisiform
- metacarpals
- phalanges (proximal, middle & distal)

Bones of the pelvis

- os coxae
- ilium
- ischium
- pubis
- acetabulum
- pubic symphysis
- obturator foramen
- crest of ilium
- false pelvis (greater pelvis)
- true pelvis (lesser pelvis)
- anterior superior iliac spine
- anterior inferior iliac spine
- ischial spine
- posterior superior iliac spine
- posterior inferior iliac spine
- greater sciatic notch
- ischial tuberosity
- lesser sciatic notch

Thigh

- femur
- head
- neck
- greater trochanter
- lesser trochanter
- linea aspera
- lateral condyle
- medial condyle
- medial epicondyle
- lateral epicondyle

Lower leg

- tibia
- lateral condyle
- medial condyle
- medial malleolus
- tibial tuberosity
- fibula
- lateral malleolus
- head

Foot

- tarsals
- talus
- calcaneus
- navicular
- medial cuneiform
- intermediate cuneiform
- lateral
- cuneiform
- cuboid
- metatarsals
- phalanges

Structures associated with the knee joint

- patella
- lateral meniscus
- medial meniscus
- synovial cavity
- anterior cruciate ligament
- posterior cruciate ligament
- fibular (lateral) collateral ligament
- tibial (medial) collateral ligament

Integumentary System

Use your textbook, lab manual and the Anatomy Coloring Book as references.

Be able to identify the following structures of the skin on slides, models and diagrams.

- Stratum corneum
- Stratum lucidum
- Stratum granulosum
- Stratum spinosum
- Stratum basale
- Papillary layer
- Reticular layer
- Epidermis
- Dermis
- Hypodermis
- Eccrine sweat gland
- Adipose tissue
- Root hair plexus
- Pacinian corpuscle
- Hair follicle
- Hair root

- Sebaceous (oil) gland
- Apocrine glands
- Arrector pili muscle
- Meissner's corpuscle
- Dermal papillae
- Free nerve endings
- Sensory nerve fiber
- Dermal blood vessels - both arteriols and venules

The Nervous System

CNS - be able to identify the following structures on charts, models, slides, cadavers, and specimens.

Use your textbook, lab manual and the Anatomy Coloring Book as references.

Be able to identify the following parts of a neuron:

- nucleus
- endoneurium
- node of ranvier
- cell body
- axon hillock
- axon
- myelin sheath
- neurofibrils
- synapse
- synaptic vesicles
- motor end plate
- neurotransmitter receptors

Be able to identify, and know the function, of the following parts of the nervous system from histology tissue slides and pictures:

- brain
- cortex
- anterior pituitary
- posterior pituitary
- hypothalamus
- pineal
- adreanal glands

Central Nervous System

be able to identify the following structures on charts, models, slides, cadavers, and specimens.

For The Brain:

- corpus callosum
- gyrus
- sulcus
- corpora quadrigemina
- superior colliculi
- inferior colliculi
- pineal body
- olfactory bulbs
- hypothalamus
- optic chiasma
- mammillary body
- septum pellucidum
- fornix
- cortex
- gray matter
- white matter
- cerebrum
- frontal lobe
- parietal lobe
- occipital lobe
- temporal lobe
- insula
- cerebellum
- arbor vitae
- pons
- medulla oblongata
- pyramids and pyramidal tracts
- choroid plexus
- dura mater
- falx cerebri
- tentorium cerebelli
- falx cerebelli
- arachnoid membrane
- pia mater
- lateral ventricles
- third ventricle
- fourth ventricle
- foramen of Monro
- cerebral aqueduct
- thalamus
- intermediate mass
- Central sulcus (also known as the fissure of Rolando)

- Precentral gyrus
- Postcentral gyrus
- lateral sulcus (also known as the Sylvian fissure or lateral fissure)
- longitudinal fissure left and right cerebral hemispheres
- transverse fissure
- cerebellar peduncle
- pituitary gland
- vermis
- cerebellum
- cerebrum
- medullated (myelinated) nerve
- motor nerve (motor neuron)
- peripheral nerve
- spinal cord
- Nissl bodies

For The Spinal Cord:

- central canal
- conus medullaris
- cauda equina
- anterior/posterior
- median fissure
- subdural space
- subarachnoid space
- epidural space
- pia mater
- dura mater
- arachnoid membrane
- white matter
- gray matter
- dorsal horn
- ventral horn
- lateral horn
- dorsal root
- ventral root
- dorsal root ganglia
- spinal nerve
- sympathetic chain ganglia

For The Neuron:

- nucleus

- endoneurium
- node of ranvier
- cell body
- axon hillock
- axon
- myelin
- Schwann cells
- Purkinje cells
- Pyramidal cells
- neurofibril

Note: For the following blood vessels see chapter 20

- Circle of Willis
- vertebral artery
- basilar artery
- internal carotid artery
- posterior/anterior/middle cerebral arteries
- posterior/anterior communicating arteries
- superior sagittal sinus
- inferior sagittal sinus
- great cerebral vein
- straight sinus
- occipital sinus
- transverse sinus
- sigmoid sinus
- superior ophthalmic vein
- cavernous sinus
- superior petrosal sinus
- inferior petrosal sinus
- internal jugular vein

PNS

be able to identify the following structures on charts, models, slides, cadavers, and specimens.

1. For each of the 12 pairs of cranial nerves, list its name, number, type, and its function.
2. Define plexus. Name the major plexuses listed below, their sites of origin, and the major nerves arising from each.
 - cervical plexus
 - brachial plexus
 - lumbar plexus
 - sacral plexus
3. Name the 5 subdivisions of the spinal nerves and state the number of nerves within each.
4. Know the five components of a reflex arc. Know the following reflexes.

- abdominal
 - achilles
 - corneal
 - crossed extensor
 - patellar
 - plantar
 - Golgi tendon
5. Be able to identify (with both name and Roman numeral) and know the function of the following cranial nerves:
- olfactory (CN I)
 - optic (CN II)
 - oculomotor (CN III)
 - trochlear (CN IV)
 - trigeminal (CN V)
 - abducens (CN VI)
 - facial (CN VII)
 - vestibulocochlear (CN VIII)
 - glossopharyngeal (CN IX)
 - vagus (CN X)
 - accessory (CN XI)
 - hypoglossal (CN XII)
6. For The Spinal Nerves:
- cervical plexus
 - brachial plexus
 - lumbar plexus
 - sacral plexus
 - cervical nerves
 - thoracic nerves
 - lumbar nerves
 - sacral nerves
 - phrenic nerve
 - musculocutaneous nerve
 - median nerve
 - ulnar nerve
 - radial nerve
 - axillary nerve
 - femoral nerve
 - obturator nerve
 - sciatic nerve

MUSCULATURE SYSTEM

Use your textbook, lab manual, tissue slides and the Anatomy Coloring Book as references.

From diagrams, models, slides and the cadaver, be able to identify the following muscles and structures:

Leg

- iliopsoas
- gluteus maximus
- gluteus medius
- gluteus minimus
- tensor fascia latae
- pectineus
- gastrocnemius
- soleus
- Achilles tendon
- Sartorius
- rectus femoris
- quadriceps femoris
- vastus lateralis
- vastus medius
- vastus intermedius
- adductor longus
- adductor magnus
- adductor brevis
- gracilis
- biceps femoris
- semimembranosus
- semitendinosus
- tibialis anterior
- tibialis posterior
- plantaris
- peroneus longus (fibularis longus)
- peroneus brevis (fibularis brevis)
- extensor digitorum longus

Arm

- deltoid
- biceps brachii
- triceps brachii
- brachialis
- pronator teres
- brachioradialis
- coracobrachialis
- flexor carpi radialis

- palmaris longus
- flexor carpi ulnaris
- extensor carpi radialis longus
- extensor carpi radialis brevis
- extensor carpi ulnaris
- extensor digitorum

Trunk

- diaphragm
- external obliques
- internal obliques
- rectus abdominis
- external intercostals
- internal intercostals
- latissimus dorsi
- lumbodorsal fascia
- pectoralis major
- pectoralis minor
- transversus abdominis
- linea alba
- serratus anterior
- trapezius
- teres major
- teres minor
- levator scapulae
- rhomboid major
- rhomboid minor
- erector spinae
- Semispinalis
- Semispinalis
- quadratus lumborum
- subscapularis
- infraspinatus

Head and Neck

- frontalis
- orbicularis oculi
- orbicularis oris
- buccinators
- masseter
- temporalis

- platysma
- splenius capitis
- scalene
- sternocleidomastoid
- occipitalis

Know the following Structures

- epimysium
- tendon
- aponeurosis
- perimysium
- endomysium
- sarcolemma
- endoplasmic reticulum
- synaptic vesicles
- synaptic cleft
- motor end plate
- junctional folds (invaginations) of motor end plate
- neurotransmitter
- acetylcholine
- acetylcholinesterase
- receptor operated channels
- voltage operated channels
- muscle fiber
- myofibrils
- myofilaments
- thin filaments
- actin
- G actin
- F actin
- tropomyosin
- troponin – TnI , TnT , TnC
- thick filaments
- myosin
- myosin tail
- myosin head
- foot proteins
- Ca²⁺ channels
- Ca-ATPase
- T tubules
- terminal cisternae
- triads

- A band
- I band
- H zone
- M line
- Z line
- fascicle
- sarcomere

Special Sense Organs

be able to identify the following structures on charts, models, slides, cadavers, and specimens.

For Visual reception:

- optic nerve
- macula lutea
- fovea centralis
- sclera
- choroid (part of the vascular layer)
- retina
- pigmented layer
- photoreceptors (sensory neurons) - rods & cones with outer and inner segments
- bipolar cells (neurons)
- ganglionic cells (neurons)
- suspensory ligaments
- vitreous humor
- aqueous humor
- conjunctiva
- optic disc
- pupil
- cornea
- anterior chamber
- posterior chamber
- anterior cavity (segment)
- posterior cavity (segment)
- lacrimal apparatus
- lacrimal gland
- lacrimal ducts
- lacrimal canal
- lacrimal sac
- lacrimal punctum
- nasolacrimal duct
- extrinsic muscles
- superior rectus

- inferior rectus
- medial rectus
- lateral rectus
- superior oblique
- inferior oblique
- ciliary body
- iris
- sphincter pupillae
- dilator pupillae
- medial canthus
- lateral canthus
- lens
- corneal epithelium
- Canal of Schlemm

For Auditory Reception:

- external auditory meatus
- auricle
- tympanic membrane
- pharyngotympanic tube (also known as the Eustachian canal or auditory tube)
- malleus
- incus
- stapes
- cochlea
- cochlear duct
- semicircular canal
- round window
- oval window
- basilar membrane
- tectorial membrane
- crista ampullaris
- vestibular membrane
- scala vestibuli
- scala tympani
- cochlear nerve
- vestibule
- vestibular nerve
- saccule
- utricle
- vestibulocochlear nerve
- organ of Corti
- ampulla

- inner hair cells
- outer hair cells
- perilymph
- endolymph
- maculae (utricle and saccule)
- crista ampullaris
- cupula (gelatinous mass)
- otolithic membrane
- otoliths
- stereocilia embedded in otolithic membrane

For Taste Reception:

- papillae - filiform, fungiform, circumvallate
- supporting cells
- gustatory cells
- gustatory hairs
- taste bud
- taste pore
- basal cells

For Olfactory Reception:

- olfactory epithelium
- olfactory receptor cells
- supporting cells
- basal cells
- olfactory cilia
- mitral cell

Special Senses

be able to identify cross-sections of the following tissues on slides, photographs and specimens.

- eye
- retina
- cornea
- cochlea
- crista ampullaris
- olfactory epithelium
- Meissner's corpuscles
- Pacinian corpuscles