ANP 1106A

Communication and Movement – the Anatomy and Physiology of the Integumentary, Musculoskeletal and Nervous Systems

January – April, 2020

The objective of this course is to provide knowledge of the anatomy of the integumentary and musculoskeletal systems and knowledge of both the anatomy and the physiology of the nervous system. Graduates of this course will have acquired knowledge of: (1) the microscopic structure of skin and bone, the names of bones, and their bony landmarks, and the structure of joints, (2) the names of muscles that generate the wide range of body movements, and, (3) the anatomy of the nervous system as well as the mechanisms by which the nervous system processes sensory information, generates movements, and participates in higher mental functions such as memory and thought. This is a 3-credit course, with 3 hours of lectures per week during the winter term.

Exams

There will be three exams throughout the duration of the course, as indicated in the outline below. Please note that Exam 1 will deal with Anatomical Terms, the Integumentary System, the Skeletal System and Joints. Exam 2 will deal with the Anatomy of the Muscular and Nervous Systems. Finally Exam 3 will concentrate on the Physiology of the Nervous System. However, please note that Exam 3 will be a final exam in that 15% of this exam will be composed of questions dealing with material examined during the two midterm exams. ***If you have to miss an exam due to illness, you must notify the course coordinator (J. Carnegie) before the exam takes place. You also have 5 school days from the day of the exam to provide appropriate medical documentation indicating that you were seen by your family physician or by University Health Services on or before exam day and found by that health care provider to be too ill on exam day to write your exam. Only then will you be eligible to write a deferred exam. If you do not write the regular exam or deferred exam, you will obtain a zero for that section of the course. For those with approved medical documents, deferred midterm #1 will be written during February Reading Week (location and time to be confirmed) and deferred midterm #2 will be written on Wednesday, March 18th, 2020, in RGN 3248, beginning at 3:30 PM.*** *The deferred final exam will take place during June. There is a free shuttle bus for students that regularly runs from the downtown campus to RGN.*

Supplemental Exams

Supplemental exams are now available for those students who fail an ANP course but do well enough to obtain an E. Students who fail with an F are not eligible for a supplemental exam and must repeat the course. The supplemental exam score will replace the original final exam score in the new calculation of the student's final grade. While both final grades will appear on the student's transcript, only the supplemental mark will be used for grade point calculations. The supplemental exam for ANP1106A will take place in June and the regulations regarding illness on exam day indicated in the preceding paragraph also apply to this exam.

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TEXTBOOK: E.N. Marieb & K Hoehn: Human Anatomy & Physiology ((11th edition, 2019) Benjamin Cummings. *The textbook package (hardcover or loose-leaf and includes the Mastering A and P access code) is available at the main bookstore at the downtown campus (UCU Bldg). You need the book and the access code for Mastering A&P that is packaged with the textbook in order to be able to do the Mastering A&P assignments. The Mastering A&P access code can also be purchased as a stand-alone item for students who have elected to purchase a second hand textbook.* The Mastering Course ID is **carnegie40696.**

WEB SITE: Brightspace. You can also access the Mastering A and P assignments via a link on the home page of our web site

LECTURES:	Mondays	13:00-14:20	CRX 240
	Wednesdays	11:30-12:50	CRX 240

OFFICE HOURS: By appointment – please just send me an email

Calculation of Final Grade

Exam 1 (Topics 1-4)	**Wednesday, January 29th**	**24% final mark**
Exam 2 (Topics 5 & 6)	**Monday, March 2nd**	**24% final mark**
Mastering A & P Assignments	**Throughout the term**	**7% final mark**
Crossword Puzzles	**Throughout the term**	**3% final mark**
Final Exam	**April 7-24, TBD**	**42% final mark**

Due Dates for Mastering A & P Assignments for Anatomy Content

Assignment Title	Available (3:00 PM)	Due Date (10:00 PM)
Assignment #1: Skin and Bones (Part 1)	Wednesday, January 15th	Tuesday, January 21st
Assignment #2: Bones (Part 2)	Wednesday, January 22nd	Tuesday, January 28th
Assignment #3: Muscles	Wednesday, February 5th	Tuesday, February 11th
Assignment #4: Neuroanatomy I	Wednesday, February 12th	Tuesday, February 25th
Assignment #5: Neuroanatomy II	Wednesday, February 26th	**Sunday, March 1st

Due Dates for Anatomy-Based Crossword Puzzles

Crossword Puzzle Title	Available (3:00 PM)	Due Date (10:00 PM)
Crossword #1: Skin and Bone Tissue	Wednesday, January 15th	Tuesday, January 28th
Crossword #2: Bones & Joints	Wednesday, January 22nd	Tuesday, January 28th
Crossword #3: Muscles	Wednesday, February 5th	Sunday, March 1st
Crossword #4: Neuroanatomy	Wednesday, February 12th	Sunday, March 1st

Due Dates for Mastering A&P Assignments for Neurophysiology Content

Assignment Title	Available (5:00 PM)	Due Date (10:00 PM)
Fortier: Sensory receptors	Wednesday, March 4th	Wednesday, March 11th
Fortier: Special senses	Monday, March 16th	Tuesday, March 24th
Fortier: Motor systems	Monday, March 23rd	Wednesday, April 1st
Fortier: Reflexes	Monday, March 30th	Monday, April 6th

*All assignments are available as study aids until the end of the final exam period. Note that there is also an **introductory assignment** that I have made available to everyone but really needs to be done only by those new to Mastering. It does not count toward your final Mastering score.*

SCHEDULE OF LECTURE TOPICS

1. Anatomical terms *(January 6; **J. Carnegie**)*
- 1.1 Define the anatomical position, the regional and the directional terms, as well as planes and sections
- 1.2 Describe the body cavities

2. Integumentary system *(January 6, 8; **J. Carnegie**)*
- 2.1 Describe the layers of the epidermis and the cells that compose them
- 2.2 Describe the layers of the dermis
- 2.3 Describe the accessory structures of the skin
- 2.4 Explain the major functions of the skin

3. Anatomy of the Skeletal System *(January 13, 15, 20, 22; **J. Carnegie**)*

3.1 Compare the structure of bony tissues and cartilages
3.2 Describe the microscopic structures of bones
3.3 Describe bone formation and remodeling, and explain the factors that affect them
3.4 Anatomy of the skeleton:

3.4.1 Axial skeleton

Skull:
- Identify and describe the cranial and facial bones
- Describe the sutures and paranasal sinuses

Vertebral column:
- Identify the regions of the vertebral column
- Describe the ligaments and intervertebral discs associated with the vertebral column
- Describe the general structure of vertebrae and compare their regional differences
- Describe the structure of the sacrum and coccyx.

Thorax:
- Describe the anatomy of the sternum and ribs

3.4.2 Appendicular skeleton

Pectoral girdle: describe the structure of the scapula and clavicle
Upper limb: identify the bones of the upper limb and their principal markings
Pelvic girdle
- Identify the bones of the pelvic girdle and their principal markings
- Distinguish between false and true pelvis; compare the structural differences between male and female pelves

Lower limb: identify the bones of the lower limb and their principal markings

4. Anatomy and Physiology of the Joints *(January 22, 27; **J. Carnegie**)*

4.1 Describe the structural and functional classification of joints
4.2 Describe the structure of synovial joints, bursae and tendon sheaths
4.3 Describe the types of movements that can occur at synovial joints
4.4 Describe the structures and movements of: shoulder, elbow, hip, knee

5. Anatomy of the Muscular System *(January 27, February 3, 5; **J. Carnegie**)*

5.1 Describe the structural organization of skeletal muscles together with their membranes and tendons or aponeuroses
5.2 Define: agonist, antagonist, synergist, fixator; origin, insertion; explain the general nomenclature of skeletal muscles
5.3 Describe the muscles of facial expression
5.4 Describe the muscles that move the eyeballs, the mandible and the tongue
5.5 Describe the muscles of the neck
5.6 Describe the muscles that move the vertebral column
5.7 Describe the respiratory muscles
5.8 Describe the muscles of the pelvic floor and perineum
5.9 Describe the muscles that move the pectoral girdle
5.10 Describe the compartments and muscles of the arm and forearm
5.11 Appreciate the complexity of the musculature of the hand
5.12 Describe the muscles that move the thigh
5.13 Describe the compartments and muscles of the thigh and leg
5.14 Appreciate the complexity of the musculature of the foot.

6. Anatomy of the Nervous System *(February 10, 12, 24, 26; **J. Carnegie**)*

6.1 Histology of the nervous tissue: describe the glial cells, the structural classification of neurons; and compare gray and white matter, nucleus and ganglion

6.2 Central nervous system

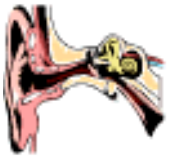
Cerebral hemispheres
- Describe the lobes, gyri and sulci of the cerebral hemispheres
- Describe the location and functions of the motor, sensory, and association areas
- Explain hemispheric lateralization

Basal nuclei and limbic system: describe their locations and functions
Cerebral white matter: describe the structures and their functions

Diencephalon
Describe the structures and functions of the thalamus, hypothalamus and epithalamus
Brainstem
Describe the structures and functions of the midbrain, pons and medulla oblongata
Explain the role of the reticular formation
Cerebellum
Describe the main structures of the cerebellum; localize the cerebellar peduncles
Spinal cord
Describe the external and internal anatomy of the spinal cord
Describe how the spinal nerves are connected to the spinal cord
Tissues and fluids surrounding the CNS
Describe how the brain and spinal cord are protected
Describe the blood-brain barrier

6.3 Peripheral nervous system
Describe the structure of a nerve
Cranial nerves:
Identify the 12 pairs of cranial nerves by name, number and type
Give the functions and origin of each.
Spinal nerves:
Describe the rami that emerge from a spinal nerve
Define plexus and identify the principal plexuses
Describe the origin and distribution of the cervical plexus
Describe the origin and distribution of the brachial plexus
Describe the origin and distribution of the lumbar plexus
Describe the origin and distribution of the sacral plexus
Define dermatome

7. Physiology of the Nervous System (March 4, 9, 11, 16, 18, 23, 25, 30; April 1; ***P. Fortier*****)**
7.1 Basic principles (nerve impulses and synaptic transmission):
Review resting potential and action potential
Describe the major classes and functions of neurotransmitters
Review the mechanisms of synaptic transmission and graded potentials
Compare the types of neural circuits
7.2 Sensory Systems
7.2.1 General principles of sensory receptors:
Sensory receptors
Explain signal transduction; define receptor potentials, and compare them to synaptic potentials
Explain the concept of adaptation; describe phasic and tonic receptors
Classify the sensory receptors according to their structure, location and function
7.2.2 Sensory transmission from receptors to cerebral cortex
7.2.2.1 Special senses



Taste: describe the gustatory receptors and the neural pathway for taste
Smell: describe the olfactory receptors and the neural pathway for smell
Hearing & Balance: Vision:
Describe the structural components of the eye
Explain the concepts of refraction, image formation, accommodation
Describe the principal refraction abnormalities
Describe the processing of visual signals in the retina
Describe the neural pathway for vision
Hearing & Balance:
Describe the anatomy of the three main regions of the ear
Explain sound waves
Describe the structure and function of outer and inner hair cells
Explain the major events involved in hearing
Describe the auditory pathway
Compare static and dynamic equilibrium, and describe the structure and function of receptor organs for equilibrium
Describe the equilibrium pathways

7.2.2.2 Somatic senses

Describe the properties and location of tactile receptors
Describe the properties and location of thermoreceptors
Describe the properties and location of nociceptors; compare somatic and visceral pain; explain the concept of referred pain
Describe the location and functions of proprioceptors
Describe the chain of neurons in the ascending pathways
Describe the principal ascending pathways

7.2.3 Perception

Distinguish between sensation and perception
Describe and discuss the principal features of perceptions

7.3 Motor systems

Discuss the levels of motor control
Describe the direct and indirect pathways of upper motor neurons
Explain the functions of the precommand systems: cerebellum and basal nuclei
Define the motor unit

7.4 Neural Integration

7.4.1 Reflex activity:

Define reflex and describe the classifications of reflexes
Describe the basic components of a reflex arc
Somatic spinal reflexes:
Describe the functional anatomy of muscle spindles and Golgi tendon organs
Describe the stretch reflex
Describe the Golgi tendon reflex
Describe the withdrawal and cross-extensor reflexes
Discuss spinal cord reflexes that cause muscle spasms
Autonomic reflexes:
Describe the levels of control of the autonomic nervous system
Compare the structural and functional differences between the somatic and autonomic nervous systems
Compare the anatomical and functional differences between the sympathetic and parasympathetic divisions of the autonomic nervous system
Describe the neurotransmitters and receptors involved in autonomic responses

7.4.2 Voluntary actions based on higher mental functions:

Locate the cortical areas for abstract planning
Describe the cortical areas responsible for language
Describe the stages of memory, categories of memory, and discuss the processes involved in transfer of information
Explain the electroencephalogram and describe the brain waves
Describe the reticular activating system
Describe the stages of sleep and discuss their functions
Describe the regions involved in mood and emotions