

ANP 1106C

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

January – April, 2017

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.

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 exams, you will obtain a zero for that section of the course. Deferred midterm #1 will be written during February Reading Week, deferred midterm #2 will be written during March and the deferred final exam will take place during June.***

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. If you want to write a supplemental exam and are eligible, you must register through the undergraduate studies office of your faculty. You will have to pay supplemental examination fees. If you don't write the exam and you haven't informed your faculty that you will not be present for it one day in advance (or do not follow university regulations if sick on exam day), you will receive the grade "INC" which is equivalent to a failure.

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TEXTBOOK: E.N. Marieb & K Hoehn: Human Anatomy & Physiology (10th edition, 2016; **packaged with Mastering A and P**). *You need the book and the online access code for Mastering A&P that is packaged with the book in order to be able to do the Mastering A&P assignments.* Mastering Course ID is **MAPCARNEGIE31950**.

WEB SITE: Blackboard Learn

LECTURES: Tuesdays 13:00-14:30 UCU AUD
Thursdays 11:30-13:00 UCU AUD

MARKING SCHEME:

Exam 1 (Topics 1-4)	Thursday, February 2nd	24% final mark
Exam 2 (Topics 5 & 6)	Tuesday, March 7 th	24% final mark
Online Assignments	Throughout the term	7% final mark
Crossword Puzzles	Throughout the term	3% final mark
Final Exam	Date to be Determined	42% final mark

1. Anatomical terms (January 10; 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 10, 12; 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 17, 19, 24, 26; 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 pelvis

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

4. Anatomy and Physiology of the Joints (January 26, 31; 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 31, February 7, 9; 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 Describe the intrinsic muscles 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 Describe the intrinsic muscles of the foot.

6. Anatomy of the Nervous System (February 14, 16, 28; March 2; 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 9, 14, 16, 21, 23, 28, 30; April 4, 6; W. Staines)

7.1 Nerve impulses and synaptic transmission:

Compare graded potentials and action potentials

Review the mechanisms of synaptic transmission

Describe the major classes and functions of neurotransmitters

Compare the types of neural circuits



7.2 Sensation and sensory receptors

Define sensation and discuss the underlying processes

Sensory receptors

Explain signal transduction; define generator and receptor potentials, and describe the patterns of nerve impulses that they generate

Explain the concept of adaptation; describe phasic and tonic receptors

Classify the sensory receptors according to their structure, location and function

Somatic sensation

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

Processing of sensation at the circuit level

Describe the chain of neurons in the ascending pathways

Describe the principal ascending pathways

Processing of sensation at the perceptual level

Describe and discuss the principal features of perceptions

7.3 Special senses

Taste: describe the gustatory receptors and the neural pathway for taste

Smell: describe the olfactory receptors and the neural pathway for smell

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

7.4 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

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

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

Describe the levels of control of the autonomic nervous system

7.5 Higher mental functions

Explain the electroencephalogram and describe the brain waves

Describe the stages of sleep and discuss their functions

Describe the stages and categories of memory and discuss the processes involved in information transfer

ANP1106C: Assignment Due Dates

Assignment Number	Available (4 PM)	Due Date (10 PM)
Assignment #1: Skin and Bones (Part 1)	Thursday, January 19 th	Wednesday, January 25 th
Assignment #2: Bones (Part 2)	Thursday, January 26 th	Wednesday, February 1 st
Assignment #3: Muscles	Thursday, February 9 th	Wednesday, February 15 th
Neuroanatomy I	Thursday, February 16 th	Wednesday, March 1 st
Neuroanatomy II	Thursday, March 2 nd	**Monday, March 6th
Ion Channels and Somatosensory	Thursday, March 16 th	Wednesday, March 22 nd
Sensory Systems	Thursday, March 23 rd	Thursday March 30 th
Motor Systems	Thursday, March 30 th	Wednesday, April 5 th
Autonomic and Higher Cortical	Thursday, April 6 th	**Monday, April 10th

*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.*

Anatomy-Based Crossword Puzzles

Crossword Puzzle Title	Available (4 PM)	Due Date (10 PM)
Crossword #1: Skin and Bone Tissue	Thursday, January 19 th	Wednesday, February 1 st
Crossword #2: Bones & Joints	Thursday, January 26 th	Wednesday, February 1 st
Crossword #3: Muscles	Thursday, February 9 th	Monday, March 6 th
Crossword #4: Neuroanatomy	Thursday, February 16 th	Monday, March 6 th