

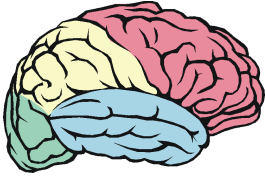


06/2011

Ex. Sci. 470

FUNCTIONAL NEUROANATOMY

Winter 2011



Course Instructor: Brent Feland, P.T., Ph.D
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Office hours: TBA- posted on my door
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Class to be held: M,W,F from 12:00 – 12:50 pm in 119 RB or anat lab

Purpose: The purpose of this class is to learn and identify basic neuroanatomy (brain landmarks) in lab and to further build on the background of anatomy and biomechanics (that should have been taken before this class). A second purpose of this class is to learn the specific spinal tracks involved with somatosensory reception and motor movement in order to understand human movement and function and to discuss and understand multiple neurologic diseases.

Text: Neuroscience: fundamentals for rehabilitation (3rd ed.) by Laurie Lundy-Ekman. ISBN: 978-1-4160-2578-8

Grading Criteria for Course	
1 st Exam (Feb 6 th)	100
2 nd Exam (March 14 th)	100
Lab Exam (TBA)	100
Presentation	100
Quizzes	100
Homework assignments	50
Final Written Exam (Tue. April 22 nd , 11:00 – 2:00)	150
Total Points	750

Grading Scale	
94-100	A
90-93	A-
86-89	B+
83-85	B
80-82	B-
76-79	C+
73-75	C
And so on	

Written Examinations

Examinations are usually given in class, sometimes the LRC. All exams must be taken when scheduled. If you take an exam late, there will be a 5 pt per day penalty. Due to the nature of this class, multiple sources of material will be used for exams (i.e. drawings, pictures, cadavers, etc.)

Attendance Policy

You must attend class! More than 2 absences will result in a loss of 10 points per absence. You can't participate if you are not here. Due to the difficulty of this material, you will fall quickly behind when you miss class. It is **your** responsibility to get caught up on material that you miss.

Quiz Policy

Quizzes will be given at the start of most class periods. You will not be allowed to make-up a quiz unless you have a university excused absence for missing class and you have contacted me before class to let me know that you will be gone. If you do have to make-up a quiz, it **must** be made-up by the following class period or you will not be able to take it. If you miss the quiz at the beginning of class because you are late, it will cost you 5 pts, and you will have to take it by the end of the same class period.

Other Required Materials

You will need to purchase a box of latex gloves for this course. You will probably only need half the gloves, so you can share the cost with someone else in class.

Order of Class Material

Note: A specific timeline is not given since different classes and students learn at different speeds. However, a general outline of the order in which class material will be presented through the semester is given:

- Chapter 1—Introduction to Neuroscience
 - General Brain structure and primary areas (plus lab)
 - Intro to cranial nerves (plus lab)

- Chapter 18—Blood supply and Cerebrospinal fluid system
 - Arterial supply (plus lab)
 - Cerebrospinal fluid system (plus lab)
 - Disorders of vascular supply (arterial & venous)
 - Transient ischemic attacks and stroke
 - Brain infarction
 - Embolus
 - Thrombus
 - Subarachnoid hemorrhage
 - Epidural and subdural hematomas
 - Hydrocephalus

- Chapter 5—Development of the nervous system
 - Developmental stages in utero
 - Neural tube and brain formation
 - Formation of hemispheres and primary structures
 - Neural tube defects
 - Anencephaly, spina bifida, Arnold-Chiari malformation etc.
 - Cerebral palsy

- Chapter 11—Peripheral nervous system
 - Brachial plexus, lumbosacral plexus, cervical plexus and all peripheral nerves (plus lab)
 - Dysfunction
 - Neuropathies
 - Mononeuropathy, multiple mononeuropathy, polyneuropathy
 - Intro to electrodiagnostic studies

- Chapter 6—Somatosensory system
 - Peripheral somatosensory receptors
 - Cutaneous innervation
 - classifications
 - Muscle spindle
 - Joint receptors
 - Sensitivity and classifications
 - Pathways to the Brain
 - Pain and Temperature pathways
 - Conscious relay pathways
 - Divergent pathways
 - Unconscious relay pathways

- Chapter 7—Somatosensation (clinical application)
 - Electrodiagnostic studies
 - Examination of somatosensory system
 - Discriminative touch
 - Conscious proprioception
 - Fast pain
 - Discriminative temperature

- Chapter 9—Motor system
 - Muscle spindle and motor units
 - Myotome levels
 - Proprioceptive reflexes
 - Motor tracts and pathways
 - Postural and gross movement tracts
 - Limb and fine movement tracts
 - Nonspecific activating tracts
 -
 - Clinical Disorders of Motor neurons
 - Paresis, paralysis, fasciculations, fibrillations, spasms, cramps etc.
 - Hyper and hypotonia- causes and symptoms
 - Poliomyelitis
 - Upper motor neuron syndrome
 - Myoplasticity, spasticity, and clonus

- Chapter 10—Basal Ganglia, Cerebellum and Movement
- EMG – understanding EMG and Nerve Conduction Studies

Specific Course Objective Examples (a list of objectives will be given before each test):

After taking this class you should be able to:

1. Describe the functional unit of the nervous system?
2. Describe the pathways of three different messaging neurons.
3. Explain glia?
4. List the 4 regions of the nervous system.
5. List the structures make-up the brain stem?
6. Identify and label the circle of willis and associated arterial supply
7. Explain the composition of white vs. gray matter.

8. Describe and identify spinal cord anatomy and explain the DRG (dorsal root ganglion) and ventral rami?
9. Describe and draw the gray and white matter in the spinal cord.
10. List and identify the cranial nerves attach to the Pons?
11. List and identify all cranial nerves and explain which are sensory, motor or mixed.
12. Describe the function of the cerebellum.
13. List or create a table of the 4 structures of the diencephalon, also list their respective functions.
14. List the 6 lobes of the cerebral hemispheres.
15. Describe commissures and their function.
16. Explain the function of the limbic system and it's structures.
17. Identify and List the 4 ventricles of the brain.
18. Explain which structure produces CSF (cerebrospinal fluid)?
19. Describe the route of venous blood in the brain.
20. List three different categorizations of lesions and describe each.
21. List the 3 development stages in utero and the time periods for each
22. Explain the two layers of blastocyst development.
23. Describe the differentiation and development of embryonic mesoderm, ectoderm, and endoderm.
24. Describe the stages of formation of the neural tube and its associated structures.
25. Create a flow chart for Brain formation (starting day 28).
26. List 3 factors that determine how quickly somatosensory information is processed.
27. Describe perception and where it occurs.
28. List 3 general classifications of somatosensory receptors
29. Define tonic and phasic receptors.
30. List and describe the classification and types of somatosensory receptors.
31. Describe and show how receptive fields differ distally and proximally
32. List receptors involved with fine touch (figure 6-3).
33. Explain the numerical and letter classification scales for sensory receptors.
34. Know the anatomy of the muscle spindle
35. Describe the tonic and phasic responses of the muscle spindle.
36. Describe the role of gamma dynamic and static axons.
37. Define the role of paciniform corpuscles and ruffini's in joint proprioception.
38. List the conscious relay, divergent, and the unconscious relay pathways and know the anatomical sites they go through from 1st to 2nd to 3rd order neurons.
39. Describe how discriminative touch from the face differs from the rest of the body.
40. Classify what parts of the body have axons carried through the fasciculus cuneatus and gracilis
41. List the types of information carried in the anterolateral columns.
42. Describe the difference between the neo and paleospinothalamic tracts.
43. Describe which primary sensory information is carried contralaterally or ipsilaterally (dependent on the tract).
44. Describe the difference between analgesia and crossed analgesia?
45. List and describe the pathways for 1st, 2nd, and 3rd order neurons in motor pathways, including the medial activation, lateral activation, and non-specific activation tracts.
46. Describe pathways and working theories for the myotatic reflex, the gto reflex, and the withdrawal reflex.
47. Demonstrate special tests for somatosensory testing .

Neurologic Disorder Presentation

Requirements

2–3 People will work together. The presentation should be approx. 20-25 minutes in length and should cover the required information listed below. You can use any format you want for this presentation (Powerpoint, overheads, video etc.), as long as it helps you to convey the information necessary to cover the required information. Unlike presentations in my Orthopedics or Anatomy classes, this presentation is to be professional, serious, and informative.

A handout covering this topic will be required to be given to each member in the class. Please do not simply print the handout in PowerPoint notes form. Make a detailed handout that will follow your flow of information in your presentation. You can even have more information in your handout than you will actually go over, just make sure it is methodical and pertinent information to understanding the disease.

When obtaining the information for the topic, please make sure to highlight the anatomical sites involved in the dysfunctions and diseases. Try to make a correlation with what is presented in the text (and what we learn in class) with the signs and symptoms of the disease.

Please make sure to cover the following:

1. Introduction—define the disease
 - a. Give info on the incidence and
 - b. What anatomical landmarks or areas it is related to.
2. Signs/Symptoms, manifestations and progression of the disease
3. Current Treatments
4. Prognosis
5. Current Research
6. List your resources used for the information

Sample Topics

Parkinson's
Huntington's
Lou Gehrig's Disease (Amyotrophic Lateral Sclerosis)
Alzheimer's
Multiple Sclerosis (MS)
Strokes and TIA's
Guillain-Barre Syndrome

Hints

A good place to start on your search for info is:

http://www.ninds.nih.gov/health_and_medical/disorder_index.htm