

GOAL

This course will provide a broad overview of the structure and function of the central nervous system. The general architecture of the nervous system and its functional systems are presented on plastinated specimen. Plastination is a novel technique for preservation of the human body by replacing water content with polymers, creating specimen that are dry, odorless, durable, and nontoxic. Professional anatomists pristinely dissected our specimen, which last 15-20 years, to exact specifications, allowing views of anatomical structures not commonly seen. Graduate students will not only benefit from hands-on neuroanatomy laboratory sessions and a practical exam (an exam of the anatomical structures), but also from experience as teaching assistants in an interprofessional course. Many PhDs will have teaching responsibilities in their careers. This course specifically trains graduate students in neuroanatomy just prior to them teaching it to first-year dental students as part of their neuroanatomy training. Graduate students will receive student evaluations from their dental students, both as feedback and proof of teaching experience.

SYLLABUS

COURSE: GS14 1181 Graduate Neuroanatomy
SEMESTER: Fall
CREDIT HOURS: 1

REVISED: 2020
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OBJECTIVES

I. INTRODUCTION TO THE CENTRAL NERVOUS SYSTEM

A. Major Divisions of the Central Nervous System

1. Distinguish anatomically the central and peripheral nervous systems.
2. Distinguish gray and white matter in the cerebrum and spinal cord.
3. Name the five divisions of the adult brain.
 - 3.1 Telencephalon
 - 3.2 Diencephalon
 - 3.3 Mesencephalon
 - 3.4 Metencephalon
 - 3.5 Myelencephalon
4. State the major features and functions of each of the five brain divisions.

B. Meninges and ventricles

1. Describe the meninges and meningeal spaces.
 - 1.1 dura mater
 - 1.2 arachnoid
 - 1.3 pia mater
 - 1.4 epidural space
 - 1.5 subarachnoid space
 - 1.6 subdural space
2. Differentiate the anatomical features of cranial and spinal meninges and spaces.
3. Describe the four ventricles of the brain and interconnecting spaces.
 - 3.1 lateral ventricles
 - 3.2 interventricular foramen
 - 3.3 third ventricle
 - 3.4 cerebral aqueduct
 - 3.5 fourth ventricle
4. Discuss the formation and circulation of cerebrospinal fluid, noting the following structures.
 - 4.1 choroid plexus
 - 4.2 foramen of Monro
 - 4.3 foramen of Magendie
 - 4.4 foramina of Luschka
 - 4.5 lumbar cistern
5. Discuss the anatomy of spinal tap.

C. Cerebral Hemispheres/Neocortex

1. Define and locate components of the telencephalon: paleocortex, neocortex, and subcortex.
2. Identify and define the anatomical limits of the following lobes of the neocortex on gross brain sections, diagrams similar to those in the text, or by means of a line drawing:
 - 2.1 frontal lobe
 - 2.2 parietal lobe
 - 2.3 temporal lobe
 - 2.4 occipital lobe
 - 2.5 insula
3. Define these terms: projection tract, association tract and commissural tract.
4. Recognize the major projection and commissural tracts.
5. Define and describe the anatomy and major behavioral symptoms of the split-brain syndrome.
6. Define and state the symptoms of:
 - 6.1 agnosia- visual, auditory, astereognosis, prosopagnosia
 - 6.2 apraxia, dyspraxia
 - 6.3 aphasia- expressive and receptive
 - 6.4 agraphia
7. Locate on the cortex or on a map of the cortex and give the name or Brodmann's numerical designations for:
 - 7.1 primary sensory areas
 - 7.2 secondary sensory areas
 - 7.3 association areas
 - 7.4 motor and premotor areas
8. Give the functions of, and the symptoms that result from lesions, in specific:
 - 8.1 primary sensory areas
 - 8.2 secondary sensory areas
 - 8.3 association areas
 - 8.4 motor and premotor areas
9. Give the name of the major cortical areas in which a lesion will result in:
 - 9.1 agnosia - all kinds
 - 9.2 apraxia
 - 9.3 aphasia - expressive & receptive
10. Locate multimodal association areas, define their functions, and the clinical manifestations of their damage.

II. TEACHING SKILLS

1. Demonstrate understanding of course content knowledge and skills.
2. Communicate clearly and effectively to students and colleagues.
3. Use effective andragogy, which is the art and science of helping adults learn.
4. Manage time and group dynamics well.
5. Conduct oneself with professional behavior befitting of an instructor.

III. LABORATORY EXERCISES

1. Identify the following structures on whole brains or on sagittally-split brains. (Laboratory Session 1)
 - 1.1 meninges: dura mater, arachnoid, pia mater
 - 1.2 ventricular system: lateral ventricles, septum pellucidum, foramen of Monro, third ventricle, cerebral aqueduct, fourth ventricle, foramina of Luschka, foramen of Magendie, choroid plexus
 - 1.3 the following components of the telencephalon
 - 1.3.1 neocortex
frontal lobe, parietal lobe, temporal lobe, occipital lobe, insula, superior longitudinal fissure, central sulcus, lateral fissure, pre-occipital notch, parieto-occipital sulcus, calcarine fissure, precentral gyrus, postcentral gyrus, corpus callosum, fornix, anterior commissure
 - 1.3.2 paleocortex/limbic cortex
cingulate gyrus, uncus, parahippocampal gyrus
 - 1.4 the following components of the brain stem
 - 1.4.1 diencephalon
hypothalamus, thalamus, third ventricle, massa intermedia, mammillary bodies, pineal body, infundibulum, pituitary gland
 - 1.4.2 mesencephalon
superior and inferior colliculi, cerebral peduncles, cerebral aqueduct
 - 1.4.3 metencephalon
superior, middle, and inferior cerebellar peduncles, arbor vitae; fourth ventricle, pons, transverse pontine fibers
 - 1.4.4 myelencephalon
medulla oblongata, pyramid, olive
2. Identify the following structures. (Laboratory Session 2)

Whole brains and sagittally-split brains

- 2.1 pontomedullary junction

- 2.2 all cranial nerves
 - I. olfactory
 - II. optic
 - III. oculomotor
 - IV. trochlear
 - V. trigeminal
 - VI. abducens
 - VII. facial
 - VIII. vestibulocochlear
 - IX. glossopharyngeal
 - X. vagus
 - XI. spinal accessory
 - XII. hypoglossal

Coronal cross sections

- 2.3 all four ventricles
- 2.4 caudate nucleus
- 2.5 lentiform nucleus: putamen, globus pallidus
- 2.6 thalamus
- 2.7 massa intermedia
- 2.8 hypothalamus
- 2.9 internal capsule
- 2.10 external capsule
- 2.11 claustrum
- 2.12 extreme capsule
- 2.13 corpus callosum
- 2.14 corona radiata
- 2.15 cerebral peduncles
- 2.16 substantia nigra
- 2.17 amygdala
- 2.18 hippocampus
- 2.19 fornix
- 2.20 insula
- 2.21 anterior commissure
- 2.22 cerebellum: arbor vitae and cerebellar peduncles

3. Identify the following structures. (Laboratory Session 3)

Dissected Brains

- 3.1 caudate nucleus head, tail
- 3.2 lentiform nucleus
- 3.3 hippocampus
- 3.4 fornix
- 3.5 amygdala
- 3.6 corona radiata
- 3.7 internal capsule
- 3.8 cerebral peduncles
- 3.9 optic radiation
- 3.10 thalamus

**GS14 1181 Graduate Neuroanatomy
2020 Fall Semester Schedule**

Labs: Friday: 9-11:50 am; Room 4310, School of Dentistry
Due to the COVID-19 pandemic, the course may be offered entirely online.

DATE	SESSION TOPICS	PRESENTER	LEARNERS
Watch online	Introduction to the Central Nervous System	Jeter	Grad students
Watch online	Neocortex	Jeter	Grad students
TBD	Teaching Assistant Training Session I	Jeter	Grad students
TBD	Teaching Assistant Training Session II	Jeter	Grad students
Watch online	Video of how Dr. Jeter teaches a lab group	Jeter	Grad students
Fri, Aug 28 9-11:50 am	Pre-Laboratory Lecture Laboratory 1	Jeter and Graduate Students	Dental students
Fri, Sep 4 9-11:50 am	Pre-Laboratory Lecture Laboratory 2	Jeter and Graduate Students	Dental students
Fri, Sep 11 9-11:50 am	Pre-Laboratory Lecture Laboratory 3	Jeter and Graduate Students	Dental students
Fri, Sep 18 noon	PRACTICAL EXAM	Jeter	Grad students
Fri, Nov 13 10-11:50am	Neurolympics competition Grad students will moderate the events.	Jeter and Graduate Students	Dental students

EVALUATION METHODS

Quiz

A multiple-choice quiz will occur before the first Teaching Assistant Training Session and is to confirm graduate students viewed the assigned online lectures. Lecture recordings will be watched on Panopto. Online lectures describe the anatomy and function of structures taught during the Training Sessions.

Examinations

Examinations will be derived directly from the objectives and will cover lectures and laboratory material. Examinations will include identification of structures on plastinated brains and slides; multiple choice and fill in the blank. Details of the examination will be provided by the instructor one week prior to the exam.

Teaching Preparedness

Teaching assistants will have several opportunities to receive feedback on their teaching. The course director and fellow teaching assistants will provide feedback to each teaching assistant during a practice session. The course director may also offer feedback throughout the course. Dental students will provide structured feedback for their teaching assistant via a survey. The grade for this component will be based on the teaching assistant's knowledge of the structures, exactness in teaching them, communication ability and willingness to incorporate feedback.

Attendance and Professionalism

Because a component of the course is serving as a teaching assistant, timely attendance at training and laboratory sessions is mandatory. Graduate students will conduct themselves with professional behavior befitting of an instructor.

Course Grading

Grading Component	% of Grade
Quiz	10%
Practical Exam	50%
Teaching Preparedness	20%
Attendance, Professionalism	20%

Disability Accommodation

If you believe you have a disability requiring an accommodation, please contact:

Dr. William Mattox
504 Disability Coordinator for GSBS
713-500-8802