

SYLLABUS
Human Functional Neuroanatomy (ANAT 6160)

COURSE DESCRIPTION:

ANAT 6160 is a graduate course for certificate level designed to provide knowledge about the anatomy and function of the human central and peripheral nervous systems with a strong emphasis on clinical relevance. General neuroanatomy topics will include the gross and microscopic structure, embryology, and neurophysiology of the brain, spinal cord and nerves with descriptions of alterations in normal anatomy through disease or injury. Students will be assigned online weekly discussions on journal articles matching the topic of the week's lecture (see *Readings*). Discussion of these topics will be monitored via an online discussion board in blackboard. In addition, students will prepare a clinical presentation on a neuroanatomical topic relevant to lecture content and derived from an article featured in popular media (e.g., *Washington Post*, *Time*, etc). Students will also be provided with interactive PowerPoint lab manual tailored to the content of the lectures that will constitute the foundation for three practical exams taken on blackboard for each neuroanatomy block. Finally, lecture material will be supplemented with laboratory demonstrations of human brain materials in the Medical School Anatomy Lab.

LEARNING OBJECTIVES:

- 1) Recognize the major features of the external and internal morphology of the adult and developing brain, spinal cord, and peripheral nerves, including the blood supply, meninges and ventricular system.
- 2) Describe the connections between anatomical structures that comprise the sensory and motor systems of the CNS.
- 3) Interpret common PNS and CNS lesions and recognize their etiology.
- 4) Illustrate clinical neuroanatomy correlates.

CREDIT HOURS: 3

PREREQUISITE: Introductory Biology for Science or non-Science Majors. Enrollment in the Graduate Certificate in Anatomical and Translational Sciences or permission of the Director of the Graduate Certificate.

LECTURE CONTACT TIME/HOURS: Tues. 11:15 a.m. – 12:30 p.m.
Thurs. 11:15 a.m. – 12:30 p.m.

Room: classes are in Ross Hall, Room 117
unless otherwise noted on schedule

LABORATORY SESSIONS: Periodic attendance in the Medical School Anatomy Lab where Anatomy faculty will demonstrate relevant anatomy of human brain specimens. Students should supplement these demonstration sessions by studying illustrations, schematic diagrams, and computer images to enhance their learning.

METHOD OF ASSESSMENT: There will be four types of assessments, as follows:

1. **3 Written Exams** : consisting of multiple choice and short answer questions; each exam comprises 16.7% of the total grade for the course
2. **3 Practical Exams** consisting of short answer questions (indep; each exam comprises 10% of the total grade; to be completed online (*individually, closed-book*) via Blackboard by 11:59pm as denoted in lecture schedule
3. **1 Clinical Presentation**: consisting of a written PowerPoint comprising 15% of total grade; to be submitted via email to Dr. Brown one week prior to the written and practical exams as denoted in lecture schedule
4. **Online weekly blackboard discussion groups**, comprising 5% of total grade; responses are due each Thursday by 11:59pm as denoted in lecture schedule (note: there is no discussion board due the week of the Thanksgiving holiday)

FACULTY: *Kirsten Brown*, Ph.D., Course Director, Assistant Professor of Anatomy and Regenerative Biology (Lecturer and Lab Instructor); Ross Hall 452A; Email: kmbrown@gwu.edu

Ronald C. Bohn, Ph.D., Associate Professor of Anatomy & Regenerative Biology (Lecturer, and Lab Instructor); Ross Hal 431; Email: rcbohn@gwu.edu

REQUIRED TEXTS: Text: The Human Brain, J. Nolte, 6th ed. (recommended; available as e-text through Himmelfarb via http://catalog.himmelfarb.gwu.edu/iii/encore/search/C_SThe%20Human%20Brain_Orightresult_U?lang=eng&suite=gwmed)

Atlas: Netter's Atlas of Neuroscience, Felten & Shetty, 2nd ed. (recommended; available as e-text through Himmelfarb via http://catalog.himmelfarb.gwu.edu/iii/encore/record/C_Rb1593396_SNetter%27s%20Atlas%20of%20Neuroscience_Orightresult_U_X7?lang=eng&suite=gwmed)

Clinical text: Clinical Neuroanatomy Made Ridiculously Simple, S. Goldberg, 5th edition (*strongly recommended*; available through Amazon)

READING LIST:

- R1. Martin CL, Phillips BA, Kilpatrick TJ, Butzkueven H, Tubridy N, McDonald E, & Galea MP. (2006). Gait and balance impairment in early multiple sclerosis in the absence of clinical disability. *Multiple Sclerosis*, 12, 620-628.
- R2. Stark AM, Nabavi A, Mehdorn HM, & Blömer U. (2005). Glioblastoma multiforme-report of 267 cases treated at a single institution. *Surgical Neurology*, 63, 162-169.
- R3. Chung YY, Ju CI, Kim SW, Kim DM. (2014). Acute hydrocephalus as a complication of cervical spine fracture and dislocation: A Case Report. *The Korean Spinal Neurosurgery Society*, 11, 74-76.
- R4. Bickley LS & Szilagyi PG. (2013). Chapter 17: The nervous system. In *Bates' Guide to Physical Examination and History Taking* (11th ed., pp. 681-691, 744-745). Philadelphia: Lippincott Williams & Wilkins.
- R5. Bates sensory testing: Bickley LS & Szilagyi PG. (2013). Chapter 17: The nervous system. In *Bates' Guide to Physical Examination and History Taking* (11th ed., pp. 718-731). Philadelphia: Lippincott Williams & Wilkins.
- R6. Bickley LS & Szilagyi PG. (2013). Chapter 17: The nervous system. In *Bates' Guide to Physical Examination and History Taking* (11th ed., pp. 708-719, 758-759). Philadelphia: Lippincott Williams & Wilkins.
- R7. Garber ST, Sivakumar W, Schmidt RH. (2012). Neurosurgical complications of direct thrombin inhibitors--catastrophic hemorrhage after mild traumatic brain injury in a patient receiving dabigatran. *Journal of Neurosurgery*, 116, 1093-1096.
- R8. Gaul C, Hastreiter P, Duncker A, Naraghi R. (2011). Diagnosis and neurosurgical treatment of glossopharyngeal neuralgia: clinical findings and 3-D visualization of neurovascular compression in 19 consecutive patients. *Journal of Headache and Pain*, 12, 527-534.
- R9. Bickley LS & Szilagyi PG. (2013). Chapter 17: The nervous system. In *Bates' Guide to Physical Examination and History Taking* (11th ed., pp. 702-709, 756-757). Philadelphia: Lippincott Williams & Wilkins.
- R10. Mandelstam SA. (2012). Challenges of the anatomy and diffusion tensor tractography of the Meyer loop. *American Journal of Neuroradiology*, 33, 1204-10
- R11. Dhaliwal A, West AL, Trobe JD, Musch DC. (2006). Third, fourth, and sixth cranial nerve palsies following closed head injury. *Journal of Neuro-Ophthalmology*, 26, 4-10.
- R12. Ritter PM, Friedman WA, Bhasin RR. (2009). The surgical treatment of trigeminal neuralgia: overview and experience at the University of Florida. *Journal of Neuroscience Nursing*, 41, 211-214.

- R13. Bickley LS & Szilagyi PG. (2013). Chapter 7: Head and Neck. In *Bates' Guide to Physical Examination and History Taking* (11th ed., pp. 214-229, 264-265, 268-269). Philadelphia: Lippincott Williams & Wilkins.
- R14. Flickinger JC, Kondziolka D, Niranjan A, Maitz A, Voynov G, Lunsford LD. (2004). Acoustic neuroma radiosurgery with marginal tumor doses of 12 to 13 Gy. *International Journal of Radiation Oncology Biology Physics*, 60, 225-230.
- R15. Jankovic J. (2008). Parkinson's disease: clinical features and diagnosis. *Journal of Neurology, Neurosurgery, & Psychiatry*, 79, 368-376.
- R16. Dronkers NF, Plaisant O, Iba-Zizen MT, Cabanis EA. (2007). Paul Broca's historic cases: high resolution MR imaging of the brains of Leborgne and Lelong. *Brain*, 130, 1432-1441.
- R17. Bickley LS & Szilagyi PG. (2013). Chapter 5: Behavior and Mental Status. In *Bates' Guide to Physical Examination and History Taking* (11th ed., pp. 152-155). Philadelphia: Lippincott Williams & Wilkins.

CLASS POLICIES

Attendance policy: mandatory

Late work: accepted with permission, penalty may be incurred if unduly late as determined by instructor
Religious Holidays: will be accommodated if requested

[NOTE: for university policies on teaching, see

<http://www.gwu.edu/~academic/Teaching/main.htm>]

ACADEMIC INTEGRITY

I personally support the GW Code of Academic Integrity. It states: "Academic dishonesty is defined as cheating of any kind, including misrepresenting one's own work, taking credit for the work of others without crediting them and without appropriate authorization, and the fabrication of information." For the remainder of the code, see: <http://www.gwu.edu/~ntegrity/code.html>

SUPPORT FOR STUDENTS OUTSIDE THE CLASSROOM

DISABILITY SUPPORT SERVICES (DSS)

Any student who may need an accommodation based on the potential impact of a disability should contact the Disability Support Services office at 202-994-8250 in the Marvin Center, Suite 242, to establish eligibility and to coordinate reasonable accommodations. For additional information please refer to: <http://gwired.gwu.edu/dss/>

UNIVERSITY COUNSELING CENTER (UCC) 202-994-5300

The University Counseling Center (UCC) offers 24/7 assistance and referral to address students' personal, social, career, and study skills problems. Services for students include:

- crisis and emergency mental health consultations
 - confidential assessment, counseling services (individual and small group), and referrals
- <http://gwired.gwu.edu/counsel/CounselingServices/AcademicSupportServices>

SECURITY

In the case of an emergency, if at all possible, the class should shelter in place. If the building that the class is in is affected, follow the evacuation procedures for the building. After evacuation, seek shelter at a predetermined rendezvous location.

Date	Lecture	Reading Assignment	
		Book	Pages
Jan 12 Tues (Bohn)	Introduction to Course and Classification of Nervous Structures	Nolte: Chp. 1 Felten & Shetty: Chp. 1	1-35 3-25
Jan 14 Thurs (Bohn)	Neurocytology I: Neurons & Glia Blackboard discussion board #1: Multiple sclerosis article (R1)	Nolte: Chp. 1 Felten & Shetty: Chp. 1	1-36 3-25
Jan 19 Tues (Bohn)	Neurocytology II: Neurons & Glia	Nolte: Chp. 1 Felten & Shetty: Chp. 1	1-36 3-25
Jan 21 Thur (Bohn)	Intro to CNS structure - external anatomy Blackboard discussion board #2: Glioblastoma multiforme article (R2)	Nolte: Chp. 3 Felten & Shetty: Chp. 3 Chp. 4	53-79 34-51 54-55
Jan 26 Tues (Bohn)	Intro to CNS structure - internal anatomy	Nolte: Chp. 3 Felten & Shetty: Chp. 3 Chp. 13	53-79 34-51 319-313
Jan 28 Thur (Bohn)	Ventricular System and CSF Blackboard discussion board #3: Hydrocephalus article (R3)	Nolte: Chp. 5 Felten & Shetty: Chp. 6	99-121 67-73
Feb 2 Tues (Brown)	Spinal Cord I - Structure and Function	Nolte: Chps. 9 Chp. 10 Felten & Shetty: Chp. 5 Chp. 10	201-226 227-264 61-65 208-217
Feb 4 Thur (Brown)	Spinal Cord II - Spinal Nerves and Reflexes Blackboard discussion board #4: Bates nervous system chapter (R4); Bates sensory system chapter (R5)	Nolte: Chp. 10 Felten & Shetty: Chp. 5 Chp. 10 Chp. 14	227-264 61-65 208-217 324-325
Feb 9 Tues (Brown)	Introduction to Sensory Pathways	Nolte: Chp. 10 Felten & Shetty: Chp. 5 Chp. 10 Chp. 14	227-264 61-65 208-217 324-329
Feb 11 Thur (Brown)	Introduction to Motor Pathways Blackboard discussion board #5: Bates	Nolte: Chp. 10 Chp. 18 Felten & Shetty:	227-264 457-473

	sensory system chapter (R5); Bates motor system chapter (R6)	Chp. 5 Chp. 15	61-65 358-366
Date	Lecture	Reading Assignment	
		Book	Pages
Feb 16 Tues	Written Exam I <u>Practical Exam I (due by 11:59 pm on FRIDAY 2/19)</u>		
Feb 18 Thur (Bohn)	Meninges: The Coverings of the Brain Blackboard discussion board #6: Intracranial bleed article (R7)	Nolte: Chp. 4 Felten & Shetty: Chp. 2 Chp. 7	80-98 31-32 96-97
Feb 23 Tues (Bohn)	Introduction to the Brainstem and Cranial Nerves	Nolte: Chp. 11 Chp. 12 Felten & Shetty: Chp. 4 Chp. 11	266-294 295-322 54-55 234-236
Feb 25 Thur (Bohn)	Cranial Nerves IX , X Blackboard discussion board #7: Glossopharyngeal neuralgia article (R8); Bates cranial nerves chapter (R9)	Nolte: Chp. 12 Chp. 13 Felten & Shetty: Chp. 11 Chp. 14	295-322 323-329 246, 248 333-335
Mar 1 Tues (Bohn)	Cranial Nerve II - Visual System	Nolte: Chp. 12 Felten & Shetty: Chp. 11	295-322 247, 250
Mar 3 Thur (Bohn and Brown)	Neuroanatomy Lab Session Blackboard discussion board #8: Meyer's loop article (R10); Bates cranial nerves chapter (R9)		
Mar 8 Tues (Bohn)	Cranial Nerves III, IV & VI	Nolte: Chp. 12 Chp. 21 Felten & Shetty: Chp. 11 Chp. 15	295-322 524-540 237-239 373
Mar 10 Thur (Bohn)	Cranial Nerves III, IV & VI Blackboard discussion board #9: CNs III, IV, and VI nerve palsies article (R11); Bates cranial nerves chapter (R9)	Nolte: Chp. 12 Chp. 21 Felten & Shetty: Chp. 11 Chp. 15	295-322 524-540 237-239 373
Mar 14-18			

SPRING BREAK			
Date	Lecture	Reading Assignment	
		Book	Pages
Mar 22 Tue (Bohn)	Cranial Nerves V, VII	Nolte: Chp. 12 Chp. 13 Felten & Shetty: Chp. 11 Chp. 14	295-322 323-329 241-244 333-335
Mar 24 Thur (Bohn)	Cranial Nerves V, VII Blackboard discussion board #10: Trigeminal neuralgia article (R12); Bates cranial nerve chapter (R9)	Nolte: Chp. 12 Chp. 13 Felten & Shetty: Chp. 11 Chp. 14	295-322 323-329 241-244 333-335
Mar 29 Tue	Written Exam II <u>Practical Exam II (due by 11:59 pm on FRIDAY 4/1)</u>		
Mar 31 Thur (Bohn)	Cranial Nerve VIII - Auditory System Blackboard discussion board #11: Bates head and neck chapter (R13)	Nolte: Chp. 12 Chp. 17 Felten & Shetty: Chp. 14	295-322 415-456 346-356
Apr 5 Tues (Bohn)	Cranial Nerve VIII - Vestibular System	Nolte: Chp. 12 Chp. 14 Felten & Shetty: Chp. 11 Chp. 14.	295-322 342-377 244 336-342
Apr 7 Thur (Bohn)	Blood Supply of CNS Blackboard discussion board #12: Acoustic neuroma article (R14)	Nolte: Chp. 6 Felten & Shetty: Chp. 7	122-148 77-91
Apr 12 Tues (Brown)	Basal Ganglia	Nolte: Chp. 19 Felten & Shetty: Chp. 3 Chp. 13 Chp. 15	474-493 46 274, 278 382-383
Apr 14 Thur	Cerebellum	Nolte: Chp. 20 Felten & Shetty:	494-523

(Brown)	Blackboard discussion board #13: Parkinson's disease article (R15); review Bates motor system chapter (R6)	Chp. 4 Chp. 11 Chp. 15	56-57 255-257 375; 379- 381
Date	Lecture	Reading Assignment	
		Book	Pages
Apr 19 Tues (Bohn)	Cerebral Cortical Functional Areas	Nolte: Chp. 22 Felten & Shetty: Chp. 3	541-579 34-41
Apr 21 Tues (Bohn)	Cerebral Cortical Functional Areas <u>Note: Class is in Ross 229</u> Blackboard discussion board #14:Broca's aphasia article (R16); Bates chapter on behavior and mental state (R17)	Nolte: Chp. 22 Felten & Shetty: Chp. 3	541-579 34-41
TBD	Written Exam III Practical Exam III (due by 11:59 pm) Clinical Powerpoint (due by 11:59 pm)		