

UNIVERSITY OF FLORIDA
COLLEGE OF MEDICINE SYLLABUS
NEUROSCIENCE
GMS 6701 Advanced Functional and Comparative
Neuroanatomy for Professionals (5 credits)

Semester: Fall 2022

Delivery Format: In person

Mon, Tues, and Fri (1:00 – 2:00 PM, L1-101), and Wed (1:00 PM – 3:00 PM; CG-67/68)

Course Director Names: Drs. Ron Mandel and Sara N. Burke

Instructor: Karina Alviña

Graduate Teaching Assistants: Cristina Besosa, Tara Cooper and Johleen Seedansingh

Room Number: LECTURES will be in MBI L1-101; LAB sessions will be in Communicore CG-67/68

Email Addresses: (Mandel) rmandel@ufl.edu; (Burke) burkes@ufl.edu

Office Hours: Dr. Burke will be available on Tues/Wed from 12pm to 1pm. Additional meetings can be scheduled with Drs. Burke, Mandel, or the graduate teaching assistants.

Canvas site: <https://ufl.instructure.com/courses/460661>

Preferred Course Communications: Canvas or email

Prerequisites: Must be a graduate student in Neuroscience or related discipline (e.g., Psychology, Clinical Health Psychology, Biomedical Engineering, Pharmacodynamics)

Purpose and Outcome: Neuroanatomy is the science of how the nervous system is built and how it functions. It is the basis for understanding nearly all aspects of modern medicine and should be a cornerstone for all discovery science and clinical research in the neurosciences. The purpose of this course is to provide graduate students with foundational knowledge of the basic anatomy, organization, and cells that make up the central nervous system in humans, primates, medium-sized quadrupeds, and rodents.

Course Overview: Neuroanatomy is a complex but rewarding field of study. The earliest documented interest in this subject appears in an Egyptian script written in the 17th century BCE that was likely based on observations made a thousand years earlier. During the 3rd century BCE, several Greek scientists, philosophers, and physicians made significant contributions to our understanding of brain structure through dissection, a practice that was outlawed for several hundred years until the Renaissance period. The driving force behind studies of the human brain continues to be our desire to explain changes in human behavior and cognition resulting from injury and disease.

In this course, you will learn the structure and function of all major systems in the central nervous system (brain and spinal cord). Our studies of the anatomy and function of the brain will be complemented by clinical cases and observations in humans. At the end of this course, you will have both a working knowledge of human, primate, medium-sized quadruped, and rodent neuroanatomy, and you will also be able to use this knowledge to explain how disruption of brain structure leads to changes in human behavior and cognition.

Relation to Program Outcomes:

After successful completion of this course, you will have a knowledge base of brain structure and function that will facilitate your graduate research and overall neuroscience training. It is also a goal that successful completion of this course will position students to serve as teaching assistants and/or instructors for a neuroanatomy course in the future.

Course Objectives and/or Goals:

Specific learning objectives will be provided at the start of each lecture and anatomy introduction. Broadly, upon successful completion of this course students will be able to:

- 1) Identify and name all structures provided on the neuroanatomy “hit list.”
- 2) Describe the neuroanatomy and function of all primary sensory and motor systems.
- 3) Describe the basic organization of higher-order cortical function.
- 4) Be able to predict precise lesion locations in the nervous when presented with detailed functional deficits (neurological symptoms).
- 5) Be able to define differences and similarities between functional neuroanatomy of animals and humans.
- 6) Understand how disruption of neural systems translates to changes in human behavior and cognition.

Instructional Methods:

The course will consist of a lecture and neuroanatomy component and exams for each component will be given approximately each month. All lectures will be recorded and made available on the CANVAS site. We ask that students please view instructors as a resource that want to share their love of neuroanatomy with you and help you be a successful researcher in the neurosciences.

It is the instructors' expectation that students taking this course will work on mastering the material presented throughout each week. It is not possible to do well in this course if the time you spend on the course is limited to a few hours on weekends. All exams in this course will utilize LockDown browser technology so it is important that you become

familiar with this technology. You will have a chance to take "practice" quizzes using this technology before taking the first course exams.

Description of Course Content:

Below is a detailed outline of the course content. This course includes a lecture and an accompanying neuroanatomy section for 5 hours of instruction each week that run concurrently. The lectures and the neuroanatomy content are designed to complement each other.

Topical Outline/Course Schedule

Week	Day/Date	Topic	Instructor/Readings
1	WED Aug 24 (LAB 1)	Course Introduction and Directional terms, Embryology, Basic Gross, and Sectional Neuroanatomy, (CG-67)	Mandel & Burke/Haines Ch 2, Nadeau Ch 1 cycles 1-2 4-10
	FRI Aug 26	Cells of the Nervous System, Blood Brain Barrier, Choroid Plexus, and CSF	<i>Mandel Ch 1,2,4, and Appendix D in Kandel, Nadeau Ch-1 cycle 3, Ch-3 cycles 1-4</i>
2	MON Aug 29	Basic Development of the CNS	Sarkisian/ <i>Ch 52, 53 in Kandel</i>
	TUES Aug 30	The resting membrane potential	Burke/ <i>Ch 6,7 and Appendix A in Kandel, Nadeau Ch 5</i>
	WED Aug 31 (LAB 2)	Diencephalon /Basal Ganglia/Basal forebrain, external cranial nerves, practice practical (CG-67)	Mandel/Haines Ch 4, Nadeau Ch 1 cycles 6-9
	FRI Sept 2	The Action Potential	Burke
3	MON Sept 5	NO CLASS – LABOR DAY	
	TUES Sept 6	Synaptic transmission	Burke/ <i>Ch 8, 9, 10 in Kandel</i>
	WED Sept 7 (LAB 3)	Spinal cord and sections of the brainstem, somatosensory tracts (CG-67)	<i>Haines Ch 5, 6/ Haines pp188-197, 206-220</i>
	FRI Sept 9	Overview of Somatosensation	Mandel/ <i>Ch 22 in Kandel, Nadeau Ch 7 cycles 2,3,5</i>
4	MON Sept 12	Touch and Proprioception, Receptors, Signal Transduction	Mandel/ <i>Ch 21, 23 in Kandel, Nadeau Ch 7 cycle 1</i>
	TUES Sept 13	Pain	Caudle/ <i>Ch 24 in Kandel, Nadeau Ch 7 cycles 6-7</i>
	WED Sept 14 (LAB 4)	Motor Tracts (CG-67)	Mandel/Haines pp 241-261
	THURS Sept 15 (Lab 4a, make up for SfN) Time 9:30AM	Basal Ganglia, and Cerebellum (CG-67) <i>Make up class for SfN</i>	
	FRI Sept 16	Autonomic nervous system	Mandel, supplemented with recording from 2021/ CH 47 in Kandel, Nadeau Ch 11

5	MON Sept 19	Motor pathways	Mandel/Ch 37 in Kandel, Nadeau Ch 6
	TUES Sept 20	Basal Ganglia	Mandel/Kandel Ch 43
	WED Sept 21 (EXAM) LECTURE EXAM 1		
	THURS Sept 22 REVIEW Time 9:30AM	Orange and Blue Anatomy Review (L1-108, small conference room)	Mandel/Burke
	FRI Sep 23 (EXAM) NEUROANATOMY EXAM 1		
6	MON Sep 26	Cerebellum Anatomy and Function	Mandel/Kandel Ch 42
	TUES Sep 27	Cognitive control of movement	Burke/Ch 19, 37, 38 in Kandel
	WED Sep 28 (LAB 5)	Cerebrovasculature (CG-67)	Mandel/Appendix C in Kandel
	FRI SEP 30	Arteries and Veins of CNS: aneurysms and territories	Mandel/Nadeau Ch 2
7	MON Oct 3	Stroke	Candelario-Jalil
	TUES Oct 4	Glymphatics and Introduction to Neuroimmunology	Mandel
	WED Oct 5 (LAB 6)	Cranial Nerves External review and Internal Anatomy (CG-67)	Burke/Haines Ch 3, Nadeau Ch 8
	FRI Oct 7	NO CLASS, homecoming	
8	MON Oct 10	Cranial Nerves I-VI	Burke/Ch 45 in Kandel
	TUES Oct 11	Cranial Nerves VII-XII	Burke
	WED Oct 12 (LAB 7)	Review of Cranial Nerve internal anatomy, and cerebellum anatomy	Burke
	FRI Oct 14	Chemical Senses: Smell and Taste	McIntyre/Ch 32 in Kandel
9	MON Oct 17	The control of Breathing	Fuller
	TUES Oct 18	The Enteric Nervous System	Burke
	WED Oct 19 (LAB 8)	Thalamus, Auditory, vestibular, and visual anatomy (CG-67)	Burke/Haines pp 154-173, 262-270
	FRI Oct 21	Horizontal Eye Movements and Pupillary Reflexes	Mandel/Ch 39 in Kandel, Nadeau Ch 8 cycles 3-4, Ch 9 cycle 5
10	MON Oct 24 (zoom)	The Visual System #1	Semple-Rowland/ Ch 26, 27, 28 in Kandel
	TUES Oct 25 (zoom)	The Visual System #2	Semple-Rowland/ Nadeau Ch 9
	WED Oct 26 (EXAM) Lecture Exam 2		
	THURS Oct 27 REVIEW Time 10AM	Orange and Blue Anatomy Review (CG-67)	Mandel/Burke

	FRI Oct 28 (EXAM) Neuroanatomy Exam 2		
11	MON Oct 31	The Thalamus – PAPER TOPIC DUE	Burke
	TUES Nov 1	The Vestibular system	Burke/ <i>Ch 40 in Kandel</i>
	WED Nov 2 (LAB 9)	Hypothalamus and limbic system (CG-67)	Burke/ <i>Haines pp 280-293, Nadeau Ch 12 cycle 4</i>
	FRI Nov 4	The Auditory system	Someya/ <i>Ch 30, 31 in Kandel</i>
12	MON Nov 7	The Hypothalamus and Endocrinology	Alviña
	TUES Nov 8	Functional Correlates of Forebrain Motor System and Cranial Nerve Damage	Mandel/ <i>Appendix B in Kandel</i> For language: <i>Ch 60 in Kandel, Nadeau Ch 12 cycle 3</i>
	WED Nov 9 (NTL 1)	NAME THE LESION (NTL) 1 (brainstem, motor, touch presentations, CG-67)	Mandel/Burke
	THUR Nov 10 10 AM	Language (L1-108) <i>Make up class for SfN</i>	Mandel
	FRI Nov 11 No Class	Veteran's Day – No class	
13	MON Nov 14	SfN – no class	Review and work on paper
	TUES Nov 15	SfN – no class	Review and work on paper
	WED Nov 16	SfN – no class	Review and work on paper
	THURS NOV 17 REVIEW and make up Time 10AM	Orange and Blue Anatomy/NTL 2 (CG-67)	Mandel/Burke
	FRI Nov 18 NTL 3	Name the Lesion 3	Mandel/Burke
14	MON Nov 21	Cortical organization of higher-level perception – PAPER DUE	Burke/ <i>Ch 17, 18, 28, 29 in Kandel</i>
14	TUES Nov 22	Learning and memory	Burke/ <i>Ch 65, 67 in Kandel, Nadeau Ch 12 cycle 5</i>
	WED Nov 23	NO CLASS – THANKSGIVING HOLIDAY	
	FRI Nov 25	NO CLASS – THANKSGIVING HOLIDAY	
15	MON Nov 28	Emotion	Burke/ <i>CH 48 in Kandel</i>
	TUES Nov 29	Rewards systems and the neurobiology of addiction	Setlow/ <i>CH 49 in Kandel</i>
	WED Nov 30 (NTL and LAB EXAM 3)	NTL EXAM and LAB EXAM 3	
	FRI Dec 2	Neuropathology	Giasson/ <i>Ch44 in Kandel</i>
16	MON Dec 5	Executive Function and the PFC	Burke
	TUES Dec 6	Neuroimaging of cognition	Burke/ <i>Ch 20 in Kandel</i>
	WED Dec 7 (last day of class)	LECTURE EXAM 3	

Class Guest Lecturers:

<u>Name</u>	<u>Email</u>	<u>Department</u>
Karina Alviña	kalvina@ufl.edu	Neuroscience
Eduardo Candelario-Jalil	ecandelario@ufl.edu	Neuroscience
Robert Caudle	rcaudle@dental.ufl.edu	Dentistry
David Fuller	ddf@php.ufl.edu	Physical Therapy
Benoit Giasson	bgiasson@ufl.edu	Neuroscience
Rick Johnson	rdjohnso@ufl.edu	Veterinary Medicine
Jeremy McIntyre	jmcin@ufl.edu	Neuroscience
Sue Semple-Rowland	rowland@ufl.edu	Neuroscience
Barry Setlow	setlow@ufl.edu	Psychiatry
Matt Sarkisian	msarkisian@ufl.edu	Neuroscience
Shinichi Someya	someya@ufl.edu	Aging

Course Materials and Technology:

LECTURE (required): Hudspeth, A. J., Jessell, T. M., Kandel, E. R., Schwartz, J. H., & Siegelbaum, S. A. (Eds.). (2013). *Principles of Neural Science*. McGraw-Hill, Health Professions Division.

(Available on Kindle)

Neuroanatomy (required): Haines, D. E. 10th Edition (9th is also acceptable) (2019). *Neuroanatomy: an Atlas of Structures, Sections, and Systems* (Vol. 153, No. 2004). Lippincott Williams & Wilkins.

SUPPLEMENTAL READING

We will also be providing you with *Medical Neuroscience* as a downloadable PDF through the CANVAS site. Authors: Stephen E. Nadeau, Tanya S. Ferguson, Edward Valentstein, Charles J. Vierk, Jeffrey C. Petruska, Wolfgang J. Streit and Louis A. Ritz, Saunders 2004, ISBN 0-7216-0249-5 (out of print).

Atlas of the Human Brain in Section. By Melville Roberts and Joseph Hanaway, Virginia. Will be made available as a pdf through the Canvas site.

Neuroanatomy Through Clinical Cases, 3rd Edition. Author: Hal Blumenfeld. Sinauer Associates, Inc. 2010. ISBN-13: 978-1605359625 We recommend you buy the hardcopy from a friend or a vendor like Amazon because we do not like the eBook interface. However, if you are interested in the eBook the link is:

<https://global.oup.com/academic/product/neuroanatomy-through-clinical-cases-9781605359625?cc=us&lang=en&>

TECHNOLOGY:

CANVAS Site:

Laptop or desktop computer equipped with microphone and video camera. A microphone and video camera will be used for video conferencing with instructors.

- There is a Canvas app that can be used to access the course using your portable devices. The app is not as good as laptop or desktop computers.
- There are VoiceThread apps that are available for iOS and Android devices that can be used to view and post comments on VTs. While these portable devices are excellent for watching lectures and asking questions, we strongly recommend that you use laptop or desktop computers when working on this course.
- **Installation of LockDown Browser** – Installation instructions will be made available prior to practice practical exams.
- A high-speed internet connection such as DSL or cable. **When using LockDown Browser your computer should be directly connected to the internet rather than accessing using WiFi.** A broadband internet connection is strongly recommended. Slower connections should still be able to access e-Learning, but will take longer to load and will be unreliable when taking tests.
- It is highly recommended that you work with Canvas and VT using either the **Firefox or Chrome Browsers.**

• In order to use Canvas and LockDown Browser (for tests so it's kind of important) you should have a late model computer running Windows 10 or 11 with 8-16 Mb RAM or a Macintosh running macOS Monterey with at least 12 Mb of RAM. If these computer requirements are beyond your capabilities to obtain please contact your instructors immediately.

- For specific questions about browser compatibilities and general questions about e-learning at UF please go to <https://wiki.helpdesk.ufl.edu/FAQs/E-Learning>.

For technical support for this class, please contact the UF Help Desk at:

- Learning-support@ufl.edu
- (352) 392-HELP - select option 2
- [UF eLearning](#)

Academic Requirements and Grading

Exams and Assignments: There will be a total of 6 exams that will make up your grade. Three exams will cover the lecture content, 3 exams will be on the neuroanatomy content and will involve identifying structures in gross anatomy or sections. The third Lab exam will also have questions related to name lesion exercises covered in the second half of the semester. There is also an optional paper assignment that is to be written in the format of a *Journal of Neuroscience* Journal Club paper: <https://www.jneurosci.org/content/jneurosci-journal-club>. Your paper grade will replace your lowest exam grade.

Student Paper: Each student will write one “Journal Club” on a paper of their choice that related to the course content. This will follow the *Journal of Neuroscience* format for Journal Club Papers (<https://www.jneurosci.org/content/jneurosci-journal-club>) and should have three components: a short overview of the background of the reviewed paper, a critical data-based review of the key findings, and a brief summary of the significance of the paper. The Journal Club should focus on the most important results (it is not necessary to discuss each figure), and a successful paper will offer a critical evaluation the results in the context of other work. Please get approval of our paper topic from an instructor by Oct. 31, 2022. This is required in order to get credit for the paper. The length should be between 1200 and 1500 words. Papers should be submitted through the Canvas site by **5:00 pm on Nov 22, 2022.**

Note regarding respect for diverse ideas: At times your instructors may make provocative statements related to course content to spark discussion. We welcome and have respect for dissenting opinions. Moreover, we feel that hearing and sharing diverse ideas is an essential component of the active learning process. Please discuss with course faculty if you ever feel that your ideas are not being heard or respected. All lectures will be recorded and available on CANVAS if discussions ever need to be reviewed.

Grading:

Requirement	Due date	Points or % of final grade (% must sum to 100%)
Lecture Exam 1	9/21	20%
Neuroanatomy Exam 1	9/23	10%
Lecture Exam 2	10/26	20%
Neuroanatomy Exam 2	10/28	10%
Paper (your paper grade will replace your lowest exam grade)	11/22	
Name the Lesion Exam and Lab Exam 3	11/30	20%
Lecture Exam 3	12/7	20%

Grades:

Percentage Earned	Letter Grade
93-100	A

90-92.9	A-
87-89.9	B+
83-86.9	B
80-82.9	B-
77-79.9	C+
73-76.9	C
70-72.9	C-
67-69.9	D+
63-66.9	D
60-62.9	D-
Below 60	E

Please be aware that a C- is not an acceptable grade for graduate students. The GPA for graduate students must be 3.0 based on 5000 level courses and above to graduate. A grade of C counts toward a graduate degree only if based on credits in courses numbered 5000 or higher that have been earned with a B+ or higher.

More information on UF grading policy may be found at:

<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#grades>

Exam Policy:

Exams will be administered online at the date and time specified on the syllabus. Exam grades will be adjusted by setting the highest score to 100%. Questions that all students get incorrect will be dropped. Final grades are curved to reflect that class average of a B+.

You are expected to notify the course directors of any anticipated absences. You should make every effort to take the exams on the days they are scheduled. If extenuating circumstances prevent you from taking a scheduled exam, you will need to schedule an appointment to discuss this with the course directors to identify an alternative exam date.

Policy Related to Make-up Exams or Other Work

Please note: Any requests for make-ups due to technical issues MUST be accompanied by the UF Computing help desk (<http://helpdesk.ufl.edu/>) correspondence. You MUST

e-mail the instructors within 24 hours of the technical difficulty if you wish to request a make-up.

Policy Related to Required Class Attendance:

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

Excused absences must be consistent with university policies in the Graduate Catalog (<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#attendance>).

Additional information can be found here:

<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

Student Expectations, Roles, and Opportunities for Input:

Expectations Regarding Course Behavior:

We expect all students to be in attendance for every lecture and Neuroanatomy, as well as to participate in class discussions.

Communication Guidelines:

Please see the NETIQUETTE GUIDE FOR ONLINE COURSES: <http://teach.ufl.edu/wp-content/uploads/2012/08/NetiquetteGuideforOnlineCourses.pdf>

Academic Integrity:

Students are expected to act in accordance with the University of Florida policy on academic integrity. As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge:

“We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.”

You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit at the University of Florida, the following pledge is either required or implied:

“On my honor, I have neither given nor received unauthorized aid in doing this assignment.”

It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For additional

information regarding Academic Integrity, please see Student Conduct and Honor Code or the Graduate Student Website for additional details:

<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>

<http://gradschool.ufl.edu/students/introduction.html>

Please remember cheating, lying, misrepresentation, or plagiarism in any form is unacceptable and inexcusable behavior.

Online Faculty Course Evaluation Process:

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals.

Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/> . Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via

<https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

Support Services:

Accommodations for Students with Disabilities:

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the Disability Resource Center by visiting <https://disability.ufl.edu/students/get-started/> . It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester. The College is committed to providing reasonable accommodations to assist students in their coursework.

Counseling and Student Health:

Students sometimes experience stress from academic expectations and/or personal and interpersonal issues that may interfere with their academic performance. If you find yourself facing issues that have the potential to or are already negatively affecting your coursework, you are encouraged to talk with an instructor and/or seek help through University resources available to you.

- The Counseling and Wellness Center 352-392-1575 offers a variety of support services such as psychological assessment and intervention and assistance for math and test anxiety. Visit their web site for more information: <http://www.counseling.ufl.edu>.
On line and in person assistance is available.
- You Matter We Care website: <http://www.umatter.ufl.edu/>. If you are feeling overwhelmed or stressed, you can reach out for help through the You Matter We

Care website, which is staffed by Dean of Students and Counseling Center personnel.

- The Student Health Care Center at UF Health is a satellite clinic of the main Student Health Care Center located on Fletcher Drive on campus. Student Health at UF Health offers a variety of clinical services. The clinic is located on the second floor of the Dental Tower in the Health Science Center. For more information, contact the clinic at 392-0627 or check out the web site at: <https://shcc.ufl.edu/>
- UF Health Emergency Room / Trauma Center: For immediate medical care call 352-733-0111 or go to the emergency room at 1515 SW Archer Road, Gainesville, FL 32698, ufhealth.org/emergency-room-trauma-center.
- University Police Department: Visit police.ufl.edu/ or call 352-392-1111 (or 9-1-1 for emergencies).
- Crisis intervention is always available 24/7 from:
Alachua County Crisis Center:
(352) 264-6789
<http://www.alachuacounty.us/DEPTS/CSS/CRISISCENTER/Pages/CrisisCenter.aspx>

Do not wait until you reach a crisis to come in and talk with us. We have helped many students through stressful situations impacting their academic performance. You are not alone so do not be afraid to ask for assistance.

Academic Resources

E-learning technical support: Contact the UF Computing Help Desk at 352-392-4357 or via e-mail at helpdesk@ufl.edu.

Career Connections Center: Reitz Union Suite 1300, 352-392-1601. Career assistance and counseling services career.ufl.edu/.

Library Support: cms.uflib.ufl.edu/ ask various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center: Broward Hall 352-392-2010 or to make an appointment 352 392-6420. General study skills and tutoring. teachingcenter.ufl.edu/

Writing Studio: 2215 Turlington Hall, 352-846-1138. Help brainstorming, formatting, and writing papers. writing.ufl.edu/writing-studio/

Student Complaints On-Campus: sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/

On-Line Students Complaints: distance.ufl.edu/student-complaint-process

