

**PSB 6087 / PSB 4934**

**Behavioral and Cognitive Neuroscience I**

**Section:** #2919 / #212G; **Class:** #24495 / #20836

**class time:** Tuesday period 7, 1:55 - 2:45 p.m. Psychology building room PSY 151  
Thursday periods 6-7, 12:50 - 2:45 p.m. Physics building room NPB 1001

**Professor:** Darragh P. Devine, Ph.D.

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273-2174

Office hours: Tuesday 10:40 - 11:30 a.m. and Friday 9:35-10:25 a.m.

Tuesday office hours are in-person in room 337 of the Psychology Building

Friday office hours are online at: Meeting ID: 926 3698 0699, Passcode: neuro

**Required Textbook:** *Principles of Neural Science, fifth edition. (2013), by E.R. Kandel, J.H. Schwartz, T.M. Jessell, S.A. Siegelbaum, and A.J. Hudspeth; ISBN #978-0071390118*

**COURSE OBJECTIVES:** The purpose of this course is to provide a broad foundation (graduate level) in the neural basis of behaviour. Lectures and reading material will emphasize the cellular and molecular biology, anatomy, physiology, and development of the nervous system, neurobiology of sensation and motor function, motivational and regulatory systems, and cognitive neuroscience. The course is formulated primarily for first-year students in the Behavioral and Cognitive Neuroscience Program, and it is intended to assure that all students entering the program achieve equivalent levels of competence in the Behavioral Neurosciences.

The textbook provides adequate coverage of all these topics and some additional topics. We will cover those topics that are essential to be well-versed in the subject matter of Behavioral Neuroscience. Additional assigned readings will provide updated and more nuanced information about the topics we will cover. Those readings will be posted on the course website [note, the reading load will be demanding during some portions of the course, and I strongly suggest that you read ahead of class meetings - so plan accordingly].

**GRADING:** These courses will have three take-home exams and one optional final exam each semester. Each take-home exam will consist of a combination of multiple choice and short essay questions. Each take-home exam will cover only the text and lecture material from the chapters that have most recently been discussed in class. The final exam will be comprehensive (i.e. all the chapters that are covered during the semester). Students will receive a grade based upon the exams.

Each of the take-home exams will count 33⅓% toward your final grade. If you perform adequately on all take-home exams and are satisfied with your grade, you may skip the final exam. If you fail to turn in a take-home exam on time, or if you do poorly on an exam, you can drop that exam/grade and take the final exam to replace it. In this case your three *best* exam scores will each count 33⅓% of your total grade.

The final is the only option for a missed or failed exam. There will be no additional makeup tests under any circumstances. A penalty of 10% per day will be imposed for any examination that is turned in late.

**The grading scheme is as follows:**

A	93-100	C	73-76
A-	90-92	C-	70-72
B+	87-89	D+	67-69
B	83-86	D	63-66
B-	80-82	D-	60-62
C+	77-79	E	<60

**Attendance:** Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies. [Click here to read the university attendance policies.](#)

**BCN I COURSE SCHEDULE:** This schedule is ambitious. It will likely be modified during the semester.

**Approximate Dates Chapter Topic**

**PART I. OVERALL PERSPECTIVE**

Aug 24 - 31 Chapter 1: The Brain and Behavior  
Aug 31 - Sept 7 Chapter 2: Nerve Cells, Neural Circuitry, and Behavior  
Sept 12 - 14 Chapter 3: Genes and Behavior

**PART II. CELL AND MOLECULAR BIOLOGY OF THE NEURON**

Sept 19 - 21 Chapter 4: The Cells of the Nervous System  
Sept 26 - 28 Chapter 5: Ion Channels

**week 5: take-home exam #1: Ch. 1-5, and all material from lectures (available Sept 22; due Sept 29)**

Oct 3 - 5 Chapter 6: Membrane Potentials and the Passive Electrical Properties of Neurons  
Oct 10 - 12 Chapter 7: Propagated Signaling: The Action Potential

**PART III. SYNAPTIC TRANSMISSION**

Oct 17 - 19 Chapter 8: Overview of Synaptic Transmission  
Oct 24 - 26 Chapter 9: Signaling at the Nerve-Muscle Synapse: Directly Gated Transmission  
Oct 31 - Nov 2 Chapter 10: Synaptic Integration in the Central Nervous System

**week 10: take-home exam #2: Ch. 5-10, and all material from lectures (available Oct 27; due Nov 3)**

Nov 7 - 9 Chapter 11: Modulation of Synaptic Transmission: Second Messengers  
Nov 14 - 16 Chapter 12: Transmitter Release  
Nov 21 - 28 Chapter 13: Neurotransmitters

We will skip chapter 14

**PART IV. THE NEURAL BASIS OF COGNITION**

Nov 30 - Dec 5 Chapter 15: The Organization of the Central Nervous System

**week 15: take-home exam #3: Ch. 11-13, 15, and all material from lectures (avail Dec 1; due Dec 8)**

**final exam week: Comprehensive Final Exam - all chapters and lectures (avail Dec 11; due Dec 15)**

**ADDITIONAL READINGS (papers will be available on the course website):**

- Ch 1. Brown RE (2019). Why Study the History of Neuroscience? *Front Behav Neurosci* **13**:82.  
Ch 2. Luo L (2021). Architectures of neuronal circuits. *Science* **373**:eabg7285.  
Ch 3. Halldorsdottir T, Binder EB (2017). Gene x Environment Interactions: From Molecular Mechanisms to Behavior. *Annu Rev Psychol* **68**:215-41.  
Ch 4. Sleigh JN, Rossor AM, Fellows AD, Tosolini AP, Schiavo G (2019). Axonal transport and neurological disease. *Nat Rev Neurol* **15**:691-703.  
Ch 5a. Roux B (2017). Ion channels and ion selectivity. *Essays Biochem* **61**:201-9.  
Ch 5b. Catacuzzeno L, Conti F, Franciolini F (2023). Fifty years of gating currents and channel gating. *J Gen Physiol* **155**.  
Ch 6. Stuart G, Spruston N, Sakmann B, Hausser M (1997). Action potential initiation and backpropagation in neurons of the mammalian CNS. *Trends Neurosci* **20**:125-31.  
Ch 7. Huang CY, Rasband MN (2018). Axon initial segments: structure, function, and disease. *Ann N Y Acad Sci* **1420**:46-61.  
Ch 8. Gutierrez R (2023). Gap Junctions in the Brain: Hardwired but Functionally Versatile. *The Neuroscientist* **0**:1-15.  
Ch 9. Li L, Xiong W-C, Mei L (2018). Neuromuscular Junction Formation, Aging, and Disorders. *Annual Review of Physiology* **80**:159-88.  
Ch 10. Chen H, Dong Y, Wu Y, Yi F (2023). Targeting NMDA receptor signaling for therapeutic intervention in brain disorders. *Rev Neurosci* **34**:635-47.  
Ch 11. Newton AC, Bootman MD, Scott JD (2016). Second Messengers. *Cold Spring Harb Perspect Biol* **8**.  
Ch 12. Kavalali ET (2015). The mechanisms and functions of spontaneous neurotransmitter release. *Nat Rev Neurosci* **16**:5-16.  
Ch 13. Reiner A, Levitz J (2018). Glutamatergic Signaling in the Central Nervous System: Ionotropic and Metabotropic Receptors in Concert. *Neuron* **98**:1080-98.  
Ch 15a. Nassi JJ, Cepko CL, Born RT, Beier KT (2015). Neuroanatomy goes viral! *Front Neuroanat* **9**:80.  
Ch 15b. Lerch JP, van der Kouwe AJ, Raznahan A, Paus T, Johansen-Berg H, Miller KL, Smith SM, Fischl B, Sotiropoulos SN (2017). Studying neuroanatomy using MRI. *Nat Neurosci* **20**:314-26.  
Ch 15c. Thiebaut de SM, Forkel SJ (2022). The emergent properties of the connected brain. *Science* **378**:505-10.

**ADDITIONAL SUPPORT 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. [Click here to get started with the Disability Resource Center](#). 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.

**ACADEMIC HONESTY GUIDELINES:** UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students 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.” The Conduct Code specifies a number of behaviors that are in violation of this code and the possible sanctions. [Click here to read the Conduct Code](#). If you have any questions or concerns, please consult with the instructor or TAs in this class.

**In-Class Recording:** Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A “class lecture” is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

#### **Campus Resources - Health and Wellness:**

*U Matter, We Care:* If you or someone you know is in distress, please contact [umatter@ufl.edu](mailto:umatter@ufl.edu), 352-392-1575, or visit [U Matter, We Care website](#) to refer or report a concern and a team member will reach out to the student in distress.

*Counseling and Wellness Center:* [Visit the Counseling and Wellness Center website](#) or call 352-392-1575 for information on crisis services as well as non-crisis services.

*Student Health Care Center:* Call 352-392-1161 for 24/7 information to help you find the care you need, or [visit the Student Health Care Center website](#).

*University Police Department:* [Visit UF Police Department website](#) or call 352-392-1111 (or 9-1-1 for emergencies).

*UF Health Shands 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 32608; [Visit the UF Health Emergency Room and Trauma Center website](#).

*GatorWell Health Promotion Services:* For prevention services focused on optimal wellbeing, including Wellness Coaching for Academic Success, visit the [GatorWell website](#) or call 352-273-4450.

**Campus Resources - Academic:**

*E-learning technical support:* Contact the [UF Computing Help Desk](#) at 352-392-4357 or via e-mail at [helpdesk@ufl.edu](mailto:helpdesk@ufl.edu).

*Career Connections Center:* Reitz Union Suite 1300, 352-392-1601. Career assistance and counseling services.

*Library Support:* 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.

*Writing Studio:* 2215 Turlington Hall, 352-846-1138. Help brainstorming, formatting, and writing papers.

*Student Complaints On-Campus:* [Visit the Student Honor Code and Student Conduct Code webpage for more information.](#)

*On-Line Students Complaints:* [View the Distance Learning Student Complaint Process.](#)