University of Florida
PSB 6088 & PSB 4934: Behavioral & Cognitive Neuroscience II
Spring 2024: Tuesdays, 12:50pm – 3:50pm, Norman (NRN) 1001

Instructor:	**Brian Odegaard, Ph.D.**	**TA:**	**None!**
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Office Hours:	Mondays: 8:00am-10:00am & Zoom if nec (Link on Canvas)		

COURSE FUNDAMENTALS

Course Overview

Welcome to the course! This version of "Behavioral & Cognitive Neursocience II" places special emphasis on the field of *cognitive neuroscience*. What is cognitive neuroscience? Cognition is a general term that we use to describe mental processes related to knowledge acquision, and encompasses topics such as attention, perception, memory, language, emotion, decision-making, and many others. Neuroscience is a field which focuses on understanding the structure and function of the nervous system and the brain. Thus, cognitive neuroscience aims to understand how coordinated brain activity gives rise to different aspects of cognition. In order to become an effective cognitive neuroscientist, you need to master the foundations of the field and have technical expertise to conduct independent research. To that end, in this course we will not only cover foundational topics in cog neuro, but also learn how to code together in Python! By the end of the course, my goal is for you to have a firm grasp on seminal topics and methods in the field, as well as increased technical skills to enhance your capacity for conducting scientific research.

Course Objectives

Over the course of this semester, students will:

- Understand experimental findings on topics such as hemispheric specialization, attention, memory, cognitive control, social cognition, and others
- Develop a capacity to code in Python, cultivating general coding skills that can be applied to other programming languages
- Acquire an understanding of research methods in cognitive neuroscience and the ability to critically evaluate published research

Required Materials

- Textbook
  Cognitive Neuroscience: The Biology of the Mind (5th Ed.)
  by Michael S. Gazzaniga, Richard B. Ivry, and George R. Mangun
  You will be required to read 1 chapter of this textbook each week.
- Supplemental Readings
  Additional readings will be uploaded to Canvas/Perusall (see pp.4-7)

Course Website: http://elearning.ufl.edu, Course Credit Hours: 3

Online Course-Management System

This class includes an in-person section every Tuesday. I do not plan to offer an online Zoom section, but I will record lecture material. You can access all course materials through the course website: https://elearning.ufl.edu/. Important class updates and announcements will be posted online. You will be responsible for all class announcements made through Canvas.

COURSE MATERIALS, ASSIGNMENTS AND GRADING SCALES

Course Grades are based on the following:

Attendance	-	140 pts
Annotated Readings	-	145 pts
Coding Exercises	-	35 pts
Exam 1	-	120 pts
Exam 2	-	80 pts
Final Exam	-	200 pts

Final letter grades in the course will be assigned according to the following percentage scale:

A	93.00-100	B+	87.00-89.99	C+	77.00-79.99	D	60.00-69.99
A-	90.00-92.99	B	83.00-86.99	C	73.00-76.99	E	00.00-59.99
		B-	80.00-82.99	C-	70.00-72.99		

Grades will be rounded to the nearest hundredth of a point and the stated letter grade cutoffs will be applied without exception. ***There is no plan to "curve" grades in this course.*** I reserve the right to adjust all students' grades up by a set value if deemed appropriate, and grades will not be adjusted down under any circumstances.

Lecture Notes/Outlines:

Class slides (in pdf or .ppt form) will be posted on the Canvas website prior to each lecture. You should look at them ahead of time. However, they are *NOT* a substitute for attending class, nor do they contain all information covered in class. Exams will be based on what is covered both in class and what is in the textbook.

Course Attendance:

You are expected to attend every class, and to have a laptop computer with you. I will take attendance, and it counts towards your final grade. Please note that you can miss ONE class period without penalty (i.e., there are 15 in-person classes; you must attend 14). If acquiring/bringing a laptop computer is going to be an issue, please let me know during the first week of class, and we will figure out a plan together. We will code in many classes, and if you miss the in-class coding exercise or fail to finish it, you will be required to complete it by the next class period. If you miss any information due to missing class, it is your responsibility to obtain it from your fellow students. Please realize that if you miss class for any reason, it is still your responsibility to (1) complete & submit Perusall/coding assignments prior to class the following week and (2) get notes, assignments, and announcements that you missed.

Exams

There are two mid-term exams and one final exam. Tests will consist of free-response questions. Make-up exams will be conducted following UF policy (https://catalog.ufl.edu/UGRD/academic-regulations/examination-policies-reading-days/). **The two midterm exams will be take-home exams, but the final exam may be in person.**

Contesting Scores

I will seriously consider any issues raised about the score of an exam or assignment. **You must submit concerns in writing (e-mail) within five school days of the score being made available to you.** Please clearly explain your reason for contesting the score. I will respond within three days of receiving the information from you.

Annotated Class Readings
We will use the Perusall tool to collaborate outside of class on each week's reading assignments. Using Perusall, students help each other learn by collectively annotating readings in threads, responding to each other's comments, and interacting with one another's ideas. You can find some good information about using Perusall at these two links:
https://www.softchalkcloud.com/lesson/serve/uBxPq9DrcYjA6J/html
https://elearning.ufl.edu/instructor-help/teaching-and-learning-tools/canvas-learning-tools/learning-tools/perusall.php

Grading for these assignments is done automatically by the Perusall tool based on the quantity and quality of your notes on each assignment, but I check periodically to make sure Perusall's judgement aligns with my own.

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

HyFlex and Video (Zoom) Recordings
I won't be offering a Zoom section of the course, but the lecture component of our in-class sessions may be audio-visually recorded for students in the class to refer back to as study aids. Again, please note that **you must attend class in person to receive attendance credit**. Note that I will **not** be recording our discussions of articles, nor in-class coding sessions.

UF POLICIES & RESOURCES

Student Disabilities
University Policy on Accommodating Students with Disabilities: Students requesting accommodation for disabilities must first register with the Dean of Students Office (https://disability.ufl.edu/students/get-started/). The Dean of Students Office will provide documentation to the student who must then provide this documentation to the instructor when requesting accommodation. You must submit this documentation prior to submitting assignments or taking the quizzes or exams. Accommodations are not retroactive; therefore, students should contact the office as soon as possible in the term for which they are seeking accommodations.

Student Misconduct
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 Honor Code (sccr.dso.ufl.edu/process/student-conduct-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Student Health & Well-Being

- **U Matter, We Care:** If you or someone you know is in distress, please contact umatter@ufl.edu, 352-392-1575, or visit umatter.ufl.edu/ to refer or report a concern and a team member will reach out to the student in distress.
- **Counseling and Wellness Center:** Visit counseling.ufl.edu/ 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 shcc.ufl.edu/.
- **University Police Department:** Visit police.ufl.edu/ 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.

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.
- *Teaching Center*: Broward Hall, 352-392-2010 or to make an appointment 352- 392-6420. General study skills and tutoring.
- *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.**

Class Readings

Week 2

Carey, M. A., Steiner, K. L., & Petri, W. A., Jr. (2020). Ten simple rules for reading a scientific paper. PLoS Computational Biology, 16(7), e1008032. https://doi.org/10.1371/journal.pcbi.1008032

Week 3

Poldrack, R. A. (2006). Can cognitive processes be inferred from neuroimaging data? Trends in Cognitive Sciences, 10(2), 59–63. https://doi.org/10.1016/j.tics.2005.12.004

Nebe, S., Reutter, M., Baker, D. H., Bölte, J., Domes, G., Gamer, M., Gärtner, A., Gießing, C., Gurr, C., Hilger, K., Jawinski, P., Kulke, L., Lischke, A., Markett, S., Meier, M., Merz, C. J., Popov, T., Puhlmann, L. M. C., Quintana, D. S., … Feld, G. B. (2023). Enhancing precision in human neuroscience. eLife, 12. https://doi.org/10.7554/eLife.85980

Week 4

Pinto, Y., Neville, D. A., Otten, M., Corballis, P. M., Lamme, V. A. F., de Haan, E. H. F., Foschi, N., & Fabri, M. (2017). Split brain: divided perception but undivided consciousness. Brain: A Journal of Neurology, 140(5), 1231–1237. https://doi.org/10.1093/brain/aww358

Pinto, Y., Villa, M.-C., Siliquini, S., Polonara, G., Passamonti, C., Lattanzi, S., Foschi, N., Fabri, M., & de Haan, E. H. F. (2023). Visual integration across fixation: automatic processes are split but conscious processes remain unified in the split-brain. Frontiers in Human Neuroscience, 17, 1278025. https://doi.org/10.3389/fnhum.2023.1278025

de Haan, E. H. F., Corballis, P. M., Hillyard, S. A., Marzi, C. A., Seth, A., Lamme, V. A. F., Volz, L., Fabri, M., Schechter, E., Bayne, T., Corballis, M., & Pinto, Y. (2020). Split-Brain: What We Know Now and Why This is Important for Understanding Consciousness. Neuropsychology Review, 30(2), 224–233. https://doi.org/10.1007/s11065-020-09439-3

Week 5

Himmelberg, M. M., Winawer, J., & Carrasco, M. (2022). Linking individual differences in human primary visual cortex to contrast sensitivity around the visual field. Nature Communications, 13(1), 3309. https://doi.org/10.1038/s41467-022-31041-9

Roth, Z. N., Kay, K., & Merriam, E. P. (2022). Natural scene sampling reveals reliable coarse-scale orientation tuning in human V1. Nature Communications, 13(1), 6469. https://doi.org/10.1038/s41467-022-34134-7

Week 6

Bao, P., She, L., McGill, M., & Tsao, D. Y. (2020). A map of object space in primate inferotemporal cortex. Nature, 583(7814), 103–108. https://doi.org/10.1038/s41586-020-2350-5

Vinken, K., Prince, J. S., Konkle, T., & Livingstone, M. S. (2023). The neural code for “face cells” is not face-specific. Science Advances, 9(35), eadg1736. https://doi.org/10.1126/sciadv.adg1736

Chang, L., & Tsao, D. Y. (2017). The Code for Facial Identity in the Primate Brain. Cell, 169(6), 1013–1028.e14. https://doi.org/10.1016/j.cell.2017.05.011

Week 7

Wu, W. (2023). We know what attention is! Trends in Cognitive Sciences. https://doi.org/10.1016/j.tics.2023.11.007

Fernández, A., Hanning, N. M., & Carrasco, M. (2023). Transcranial magnetic stimulation to frontal but not occipital cortex disrupts endogenous attention. Proceedings of the National Academy of Sciences of the United States of America, 120(10), e2219635120. https://doi.org/10.1073/pnas.2219635120

Week 9

Rose, N. S., LaRocque, J. J., Riggall, A. C., Gosseries, O., Starrett, M. J., Meyering, E. E., & Postle, B. R. (2016). Reactivation of latent working memories with transcranial magnetic stimulation. Science, 354(6316), 1136–1139. https://doi.org/10.1126/science.aah7011

Schurgin, M. W., Wixted, J. T., & Brady, T. F. (2020). Psychophysical scaling reveals a unified theory of visual memory strength. Nature Human Behaviour, 4(11), 1156–1172. https://doi.org/10.1038/s41562-020-00938-0

Rose, N. S. (2020). The Dynamic-Processing Model of Working Memory. Current Directions in Psychological Science, 29(4), 378–387. https://doi.org/10.1177/0963721420922185

Steel, A., Silson, E. H., Garcia, B. D., & Robertson, C. E. (2024). A retinotopic code structures

the interaction between perception and memory systems. Nature Neuroscience, 1–9. https://doi.org/10.1038/s41593-023-01512-3

Week 12

Tang, J., LeBel, A., Jain, S., & Huth, A. G. (2023). Semantic reconstruction of continuous language from non-invasive brain recordings. Nature Neuroscience, 26(5), 858–866. https://doi.org/10.1038/s41593-023-01304-9

Leonard, M. K., Gwilliams, L., Sellers, K. K., Chung, J. E., Xu, D., Mischler, G., Mesgarani, N., Welkenhuysen, M., Dutta, B., & Chang, E. F. (2023). Large-scale single-neuron speech sound encoding across the depth of human cortex. Nature. https://doi.org/10.1038/s41586-023-06839-2

Huth, A. G., de Heer, W. A., Griffiths, T. L., Theunissen, F. E., & Gallant, J. L. (2016). Natural speech reveals the semantic maps that tile human cerebral cortex. Nature, 532(7600), 453–458. https://doi.org/10.1038/nature17637
But check out the brainviewer based on this paper here: https://gallantlab.org/viewer-huth-2016/

Week 14

Parkinson, C., Kleinbaum, A. M., & Wheatley, T. (2018). Similar neural responses predict friendship. Nature Communications, 9(1), 332. https://doi.org/10.1038/s41467-017-02722-7

Week 15

Frith, C. D. (2019). The neural basis of consciousness. Psychological Medicine, 1–13. https://doi.org/10.1017/S0033291719002204

Seth, A. K., & Bayne, T. (2022). Theories of consciousness. Nature Reviews. Neuroscience, 23(7), 439–452. https://doi.org/10.1038/s41583-022-00587-4

LeDoux, J. E., Michel, M., & Lau, H. (2020). A little history goes a long way toward understanding why we study consciousness the way we do today. Proceedings of the National Academy of Sciences of the United States of America, 117(13), 6976–6984. https://doi.org/10.1073/pnas.1921623117

Is the integrated information theory of consciousness scientific? (Link & citation TBD)

Week 16

Tentatively, these papers (but we can discuss/change them as new stuff comes out):

van Rooij, I., Guest, O., Adolfi, F. G., de Haan, R., Kolokolova, A., & Rich, P. (2023). Reclaiming AI as a theoretical tool for cognitive science. https://doi.org/10.31234/osf.io/4cbuv

Webb, T., Holyoak, K. J., & Lu, H. (2023). Emergent analogical reasoning in large language models. Nature Human Behaviour, 7(9), 1526–1541. https://doi.org/10.1038/s41562-023-01659-w

Binz, M., Alaniz, S., Roskies, A., Aczel, B., Bergstrom, C. T., Allen, C., Schad, D., Wulff, D., West, J. D., Zhang, Q., Shiffrin, R. M., Gershman, S. J., Popov, V., Bender, E. M., Marelli, M., Botvinick, M. M., Akata, Z., & Schulz, E. (2023). How should the advent of large language models affect the practice of science? In arXiv [cs.CL]. arXiv. http://arxiv.org/abs/2312.03759

Tuckute, G., Sathe, A., Srikant, S., Taliaferro, M., Wang, M., Schrimpf, M., Kay, K., & Fedorenko, E. (2024). Driving and suppressing the human language network using large language models. Nature Human Behaviour, 1–18. https://doi.org/10.1038/s41562-023-01783-7

COURSE SCHEDULE

Week	Dates	Topic	Reading Due	In-Class Coding
1	Jan. 9	Intro + History of Cog Neuro + Why Coding Matters	Ch 1	NO
2	Jan. 16	Brain Structure & Function– Our BIG BRAIN REVIEW DAY!	Ch 2	NO
3	Jan. 23	Cog Neuro Methods	Ch 3 + Poldrack 2006	In-Class Setup
4	Jan. 30	Hemispheric Specialization	Ch 4 + 2 Yair Pinto papers	YES
5	Feb. 6	Sensation & Perception	Ch 5 + V1 papers	YES
6	Feb. 13	Object Recognition	Ch 6 + 4 Papers	YES
7	Feb . 20	Attention + EXAM 1 ASSIGNED	Ch 7 + Wu/Fernandez	NO
8	Feb. 27	Action + EXAM 1 DUE	Ch 8	YES
9	Mar. 5	Memory	Ch 9 + 4 Papers	YES
10	~	NO CLASS – SPRING BREAK!		
11	Mar. 19	Emotion	Ch 10	YES
12	Mar. 26	Language + EXAM 2 ASSIGNED	Ch 11 + Huth/Chang papers	NO
13	Apr. 2	Cognitive Control + EXAM 2 DUE	Ch 12	YES
14	Apr. 9	Social Cognition	Ch 13 + Parkinson et al. 2018	YES
15	Apr. 16	Consciousness	Ch 14 (optional) + 4 papers	NO
16	Apr. 23	Large Language Model Day!	No textbook, but 3-4 papers	TBD
		FINAL EXAM – TBD		