

Introduction to Neurophysiological Psychology (PSY 451)



Bill Griesar, Ph.D., **Instructor**, griesar@pdx.edu

(Please use this email address; NOT Canvas)

Instructor Student Hours: ZOOM, by appointment

Jennifer Notter, TA; jnotter@pdx.edu

Crystal Clark, TA; crclark@pdx.edu

TBD, **Graduate TA**,

TA Student Hours: ZOOM, Fridays

HYBRID, September 26 – December 9, 2022

IN PERSON classes Mondays, 12:45 – 1:45pm

Portland State University, ASRC Room 230

Online ZOOM classes Wednesdays 12:45 – 1:45pm

Online TA ZOOM reviews Fridays, 12:45 – 1:45pm

TEXTBOOK (optional; NOT REQUIRED):

Neuroscience: Exploring the Brain, by Bear, et al

This course satisfies pre-requisites for Advanced Neurophysiological Psychology (PSY 452)

GOAL OF THE COURSE: Neurophysiological Psychology is the study of the nervous system and how it underlies behavior. The goal of this class is to introduce you to the structure and function of the nervous system, some methods used to study the brain and behavior, and specific cognitive abilities (including attention, “default” rumination and emotional regulation) that are currently under study.

GRADES: Grades are assigned on a 90+ (A), 80-89 (B), 70-79 (C) and 60-69 (D) point scale. Points are awarded on the basis of your understanding of the material as assessed by online quizzes, a midterm and a final exam. Additional points can be earned by participating in weekly discussion forums and completing a “found object” art project. Students taking this course “pass-fail” must maintain a C- average (70%) to receive a passing grade.

QUIZZES (20 points; 5 points each): Four timed, online quizzes will test your knowledge of course material presented during the previous few lectures. Each quiz will be available for several days, and you will be able to make one continuous attempt.

FOUND OBJECT ART PROJECT (20 points): Look around your own environment (your living space, neighborhood, the PSU campus - anywhere!) for objects and forms that reflect a neurobiological structure we've learned about in class. You are welcome to either arrange multiple objects, or take one as is, but once you have them (or it) organized, take a picture and then label five specific parts that you see. Write a short paragraph that both explains what the neurobiological structure is, and (briefly) describes its function.

DISCUSSION FORUMS (20 points): Students are required to post their own responses to questions in our ten weekly discussion forums, which cover topics we'll be learning about in Zoom class meetings, online video lectures and other resources and links on Canvas.

Each post must be at least 100 words (300 max) and you must respond to at least TWO peers in 50 words or more each. FORUM POSTS ARE DUE THURSDAYS (by 11:59pm); peer responses are DUE by SUNDAY (by 11:59pm). NOTE: Two forum posts/responses can be missed without any penalty ☺

MIDTERM EXAM (20 points): *The timed, online midterm will cover all the material presented in the class up to and including the lectures on the visual system.* The midterm will be available for several days, and you will be able to make one continuous attempt.

FINAL EXAM (25 points): *The timed, online final exam is comprehensive,* but will draw more from the lectures and reading assignments presented *after* the midterm exam. The final will be available for several days, and you will be able to make one continuous attempt.

Academic Honesty

Any evidence of cheating or plagiarism will lead to serious academic consequences, including possible failure of the course and/or dismissal from school. Plagiarism is also a violation of the PSU Student Conduct Code. For information: http://www.ess.pdx.edu/OSA/osa_b.htm.

Access and Inclusion for Students with Disabilities

Welcome to the course! PSU values diversity and inclusion; we are committed to fostering mutual respect and full participation for all students. My goal is to create

a learning environment that is equitable, useful, inclusive, welcoming and fun. Multiple perspectives and methods of expression are encouraged, including art projects, to help students explore compelling research on brain and behavior.

If any aspects of instruction or course design result in barriers to your inclusion or learning, **please notify me**. The Disability Resource Center (DRC) provides reasonable accommodations for students who encounter barriers in the learning environment.

If you have, or think you may have, a disability that may affect your work in this class and feel you need accommodations, contact the Disability Resource Center to schedule an appointment and initiate a conversation about reasonable accommodations. The DRC is located in 116 Smith Memorial Student Union, 503-725-4150, drc@pdx.edu, <https://www.pdx.edu/drc>.

If you already have accommodations, please contact me to make sure that I have received a faculty notification letter and discussed your accommodations.

- Students who need accommodations for tests and quizzes are expected to schedule their tests to overlap with the time the class is taking the test.
- For information about emergency preparedness, please go to the [Fire and Life Safety webpage](https://www.pdx.edu/environmental-health-safety/fire-and-life-safety) (<https://www.pdx.edu/environmental-health-safety/fire-and-life-safety>) for information.

NOTE: Incompletes are rare, and are based on criteria in the university catalog. Incompletes are not appropriate when less than ¾'s of course work has been scored.

CHALLENGES: *Look over the course requirements in our syllabus, and on Canvas. If you are unclear about what's expected for an assignment, or assessment, please let me know.* Life DEFINITELY has ups and downs, and everyone struggles sometimes with family, work, and other personal concerns and commitments. But not everyone has access to the same resources, or experiences the world in the same way. If there is a serious, unexpected, documented and significant emergency, please get in touch! But be aware that I'm obligated to treat all students fairly, and that means each of you should ask questions, think ahead and plan for when assignments are due. *Everyone is subject to the same course expectations.*

THE LECTURES:

Introduction to the nervous system

WEEK ONE (9/26 – 9/30): Introduction to Neurons and Glia

***MEET:** In Person Monday, Wednesday/Friday on Zoom, 12:45 – 1:45pm

***POST:** To Discussion Forum by 11:59pm Thursday; two responses due 11:59pm Sunday

Welcome to the course, course information, syllabus; dividing up the nervous system (PNS vs. CNS, ANS vs. somatic/“voluntary”), historical debates (localization vs. holism, evolving perspectives on the brain); what is a cell?, how many brains cells do we have?, how many do other animals have? basic intracellular components, what are glial cells?; new research on importance of glia; what are neurons?, neuron structure and function

WEEK TWO (10/3 – 10/7): Resting/action potentials, and the synapse

***MEET:** In Person Monday, Wednesday/Friday on Zoom, 12:45 – 1:45pm

***POST:** To Discussion Forum by 11:59pm Thursday; two responses due 11:59pm Sunday

- **QUIZ ONE AVAILABLE ONLINE 10/5 – 10/9**

- Introduction to the course, neurons, glia, resting potential

What do neurons do?, **Resting potential**, *How are neurons set up to carry information?*; **Action potential**, current propagation, voltage-gated ion channels, voltage changes/time course; *How do neurons carry messages?* **The synapse**; neural networks; types of synaptic connections, peri-neuronal nets; myelin, multiple sclerosis, *What happens when the timing of neural signaling changes?*

WEEK THREE (10/10 – 10/14): The synapse, where neurons connect

***MEET:** In Person Monday, Wednesday/Friday on Zoom, 12:45 – 1:45pm

***POST:** To Discussion Forum by 11:59pm Thursday; two responses due 11:59pm Sunday

How do messages travel between neurons? Golgi and Cajal, parts of the synapse, presynaptic release of neurotransmitter; postsynaptic receptors (ionotropic/ligand-gated, metabotropic/GPCR), postsynaptic responses (EPSPs, IPSPs, summation); *How do neurons communicate with each other?*; neurotransmitters, neuromodulators, hormones; “classical” vs. “non-classical” neurotransmitters, modulatory neurotransmitters.

WEEK FOUR (10/17 – 10/21): Neurotransmitters

***MEET:** In Person Monday, Wednesday/Friday on Zoom, 12:45 – 1:45pm

***POST:** To Discussion Forum by 11:59pm Thursday; two responses due 11:59pm Sunday

- **QUIZ TWO AVAILABLE ONLINE 10/19 – 10/23**

- The action potential, and the synapse

Acetylcholine (ACh), monoamines (including dopamine/DA, norepinephrine/NE, serotonin/5-HT; amino acids (glutamate and GABA); drugs, drug use disorders

WEEK FIVE (10/24 – 10/28): Basic brain structures and neocortex

***MEET:** In Person Monday, Wednesday/Friday on Zoom, 12:45 – 1:45pm

***POST:** To Discussion Forum by 11:59pm Thursday; two responses due 11:59pm Sunday

- **QUIZ THREE AVAILABLE ONLINE 10/26 – 10/30**
- Neuropharmacology, basic brain organization, neocortex

Large scale structures/networks in the brain: anatomical terminology; basic gross neuroanatomy (e.g., cortex, lobes, sulci and gyri, white matter vs. gray matter, CSF, ventricles, cerebellum), brainstem, hypothalamus, thalamus, basal ganglia, limbic system structures (including amygdala, nucleus accumbens, hippocampus, anterior cingulate,...); primary motor and sensory cortices, corpus callosum, cortical structure/function, higher-level association cortex; distributed network development

WEEK SIX (10/31 – 11/4): The visual and auditory systems

***MEET:** In Person Monday, Wednesday/Friday on Zoom, 12:45 – 1:45pm

***POST:** To Discussion Forum by 11:59pm Thursday; two responses due 11:59pm Sunday

Introduction to sensory systems, general stimulus aspects; a focus on vision: eye, retina, photoreceptors, bipolar/horizontal/amacrine/ganglion cells, phototransduction (paradoxical “dark current”); central visual pathways, optimal stimuli, receptive fields

MIDTERM EXAM (AVAILABLE ONLINE 11/2 – 11/13)*Methodology***WEEK SEVEN (11/7 – 11/11): Techniques**

***NO REVIEW FRIDAY: Happy Veterans Day!**

***MEET:** In Person Monday, Wednesday on Zoom, 12:45 – 1:45pm

***POST:** To Discussion Forum by 11:59pm Thursday; two responses due 11:59pm Sunday

Neuroanatomical techniques: microscopes, microtomes, retrograde/anterograde staining, electron microscopy, metabolic tracers, Brodmann areas/updates; Electrophysiology: direct electrical stimulation, single vs. multi-cell recording, EEG, Event related potentials (ERP), transcranial magnetic stimulation; Imaging techniques & Genetic techniques: Pictures! Structural vs. functional techniques; in-depth examination of CAT, PET, MRI, fMRI, rsfMRI, DTI, Western blots, knockout mice, in situ hybridization and more.

WEEK EIGHT (11/14 – 11/18):

***MEET: NO CLASS MONDAY OR WEDNESDAY**

Zoom Review FRIDAY 12:45 – 1:45pm

***POST:** To Discussion Forum by 11:59pm Thursday; two responses due 11:59pm Sunday

*Current Topics in Neuroscience Research***WEEK NINE (11/21 – 11/25): Emotional regulation/feeling*****NO REVIEW FRIDAY: Happy Thanksgiving!*****MEET:** In Person Monday, Wednesday on Zoom, 12:45 – 1:45pm***POST:** To Discussion Forum by 11:59pm Thursday; two responses due 11:59pm Sunday

- **QUIZ FOUR AVAILABLE ONLINE 11/23 – 11/27**
- Anatomy, electrophysiology, imaging, genetic techniques
- **FOUND OBJECT ART PROJECT DUE BY SUNDAY**

Emotion/Feeling and the Limbic System; Papez circuit (rationale and anatomy), Kluver-Bucy syndrome, the limbic system, role of the amygdala, motivation and reward, the hippocampus; contributions of emotion to memory; emotional regulation

**** HAPPY THANKSGIVING ******WEEK TEN (11/28 – 12/2): Attention and "default"*****MEET:** In Person Monday, Wednesday/ Friday on Zoom, 12:45 – 1:45pm***POST:** To Discussion Forum by 11:59pm Thursday; two responses due 11:59pm Sunday

Selective attention: various forms of attention; arousal vs. attention, alertness and attention; visual attention, what versus where visual pathways, selective attention increases cell response; attention enhances processing of specific visual features; hemispatial neglect syndrome, Balint's syndrome; the default mode network (rumination, taking the perspective of others, daydreaming, retrieving memories, planning future activities)

FINAL EXAM (AVAILABLE ONLINE 11/30 – 12/7)**QUIZ TOPICS**

- Quiz One: Introduction to the course, neurons, glia, resting potential
- Quiz Two: The action potential, and the synapse
- Quiz Three: Neuropharmacology, basic brain organization, neocortex
- Quiz Four: Neuroanatomy, electrophysiology, genetic and imaging techniques

TITLE IX REPORTING OBLIGATIONS

Portland State is committed to providing an environment free of all forms of prohibited discrimination and sexual harassment (sexual assault, domestic and dating violence, gender or sex-based harassment and stalking). If you have experienced any form of sexual harassment, know that help and support are available. PSU has staff members trained to support survivors in navigating campus life, providing academic support and more. Information about PSU's support services on campus, including [confidential services](#) and [reporting options](#), can be found on PSU's [Sexual Misconduct Response website](#) or you may call a Confidential Advocate at 503.894.7982 or by scheduling [online](#). You may also report any incident of discrimination or discriminatory harassment, including sexual harassment, to the **Title IX Coordinator**, [Office of Equity and Compliance](#), or the [Office of the Dean of Student Life](#).

Please be aware that all PSU faculty members and instructors **are required to report** information of an incident that may constitute prohibited discrimination, including sexual harassment and sexual and relationship violence. This means that if you tell me about a situation of sexual harassment or discrimination, I have to share the information with the University's Title IX Coordinator or the Office of the Dean of Student Life. However, the information will be kept private and only those with a need to know will be provided with what you disclose.

Please complete the required student module [Understanding Sexual Misconduct and Resources](#) in Canvas, which provides information about PSU policy and resources. You may also report sexual and relationship violence to law enforcement on campus with [Campus Public Safety Office \(CPSO\)](#).

Or you may file an [anonymous report with Campus Public Safety Office](#) or a [Bias Incident report](#) with the [Bias Review Team \(BRT\)](#). PSU does not typically investigate the reports that are made through these two avenues. These reports help PSU understand what students and employees are experiencing on and around campus and provide support where needed.

Recordings in Zoom classes

We will use technology for virtual meetings and recordings in this course. Our use of such technology is governed by FERPA, the [Acceptable Use Policy](#) and PSU's [Student Code of Conduct](#). A record of all meetings and recordings is kept and stored by PSU, in accordance with the Acceptable Use Policy and FERPA. Your instructor will not share recordings of your class activities outside of course participants, which include your fellow students, TAs/GAs/Mentors, and any guest faculty or community based learning partners that we may engage with. **You may not share recordings outside of this course.** Doing so may result in disciplinary action.

COVID-19

Portland State claims to address the health, safety, and well-being of the entire PSU community during the COVID-19 pandemic. “Every effort” is being made to provide an accurate and efficient flow of communication to students, staff, and faculty. As questions and concerns arise, many campus resources are available. If you are ever unsure how to find a resource you need or want, explore the College of Liberal Arts and Sciences' website at pdx.edu/clas/covid-19-resources-for-students. Help is near. Reach out.

