

Introduction to Neurophysiological Psychology (PSY 451)



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

(Please use this email address; NOT d2l)

Instructor Student Hours: ZOOM, Mondays 2 – 3:00pm

Magda Armendariz Sullivan, **TA**; (mad33@pdx.edu)

Quinn Westlynd, **TA**; (celena2@pdx.edu)

Raven Douglas, **Graduate TA**, rdoug2@pdx.edu

Grad TA Student Hours: ZOOM, by appointment

September 27 – December 10, 2021

Online ZOOM classes M/W 12:45 – 1:45pm

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 d2l.

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 more information see:

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 d2l. 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 am 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 (9/27 – 10/1): Introduction to Neurons and Glia

***MEET:** Zoom Classes Monday, Wednesday AND Friday this week, 12:45 – 1:45pm

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 (10/4 – 10/8): Resting/action potentials, and the synapse

***MEET: NO ZOOM CLASS MONDAY**

Zoom Review Wednesday, class Friday this week, 12:45 – 1:45pm

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?*

- **QUIZ ONE AVAILABLE ONLINE 10/6 – 10/13**
- Introduction to the course, neurons, glia, resting potential

WEEK THREE (10/11 – 10/15): The synapse, where neurons connect

***MEET:** Zoom Classes Monday & Wednesday; Review Friday 12:45 – 1:45pm

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 (10/18 – 10/22): Neurotransmitters

***MEET:** Zoom Classes Monday & Wednesday; Review Friday 12:45 – 1:45pm

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

- **QUIZ TWO AVAILABLE ONLINE 10/20 – 10/27**
- The action potential, and the synapse

WEEK FIVE (10/25 – 10/29): Basic brain structures and neocortex

***MEET:** Zoom Classes Monday & Wednesday; Review Friday 12:45 – 1:45pm

Large scale structures/networks in the brain (10/28): 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

- **QUIZ THREE AVAILABLE ONLINE 10/27 – 11/3**
- Neuropharmacology, basic brain organization, neocortex

WEEK SIX (11/1 – 11/5): The visual system

***MEET:** Zoom Classes Monday & Wednesday; Review Friday 12:45 – 1:45pm

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 11/3 – 11/14)

WEEK SEVEN (11/8 – 11/12): The auditory system

***MEET:** Zoom Classes Monday & Wednesday; Review Friday 12:45 – 1:45pm

Sound (frequency/pitch, intensity/loudness, complexity/timbre), the ear (outer, middle, inner), the cochlea, hair cells, how the brain encodes pitch, loudness; central auditory pathways, tonotopy, sound localization

Methodology

WEEK EIGHT (11/15 – 11/19): Techniques

***MEET: NO ZOOM CLASS MONDAY**

Zoom Class Wednesday; Review Friday 12:45 – 1:45pm

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,...

Current Topics in Neuroscience Research

WEEK NINE (11/22 – 11/26): Emotional regulation/feeling

***MEET:** Zoom Classes Monday & Wednesday; Review Friday 12:45 – 1:45pm

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 ****

- **QUIZ FOUR AVAILABLE ONLINE 11/24 – 12/1**
- **FOUND OBJECT ART PROJECT DUE BY SUNDAY**
- Anatomy, electrophysiology, imaging, genetic techniques

WEEK TEN (11/29 – 12/3): Attention and "default"

***MEET:** Zoom Classes Monday & Wednesday; Review Friday 12:45 – 1:45pm

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 12/1 – 12/8)

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

Title IX is a federal law that requires the university to appropriately respond to any concerns of sex/gender discrimination, sexual harassment or sexual violence.

To assure students receive support, faculty members are required to report any instances of sexual harassment, sexual violence and/or other forms of prohibited discrimination to PSU's Title IX Coordinator, [Julie Caron](#).

If you would rather share information about these experiences with an employee who does not have these reporting responsibilities and can keep the information confidential, please contact one of the following campus resources (or visit this [link](#)):

Women's Resource Center (503-725-5672) or schedule on line at <https://psuwrc.youcanbook.me>

Center for Student Health and Counseling (SHAC): 1880 SW 6th Ave, (503) 725-2800

Student Legal Services: 1825 SW Broadway, (SMSU) M343, (503) 725-4556

PSU's Title IX Coordinator and Deputy Title IX Coordinators can meet with you to discuss how to address concerns that you may have regarding a Title IX matter or any other form of discrimination or discriminatory harassment. Please note that they cannot keep the information you provide to them confidential but will keep it private and only share it with limited people that have a need to know. You may contact the Title IX Coordinators as follows:

PSU's Title IX Coordinator: Julie Caron by calling 503-725-4410, via email at titleixcoordinator@pdx.edu or in person at Richard and Maureen Neuberger Center

Deputy Title IX Coordinator: Yesenia Gutierrez by calling 503-725-4413, via email at yesenia.gutierrez.gdi@pdx.edu or in person at RMNC, 1600 SW 4th Ave, Suite 830

Deputy Title IX Coordinator: Dana Walton-Macaulay by calling 503-725-5651, via email at dana26@pdx.edu or in person at Smith Memorial Union, Suite, 1825 SW Broadway, Suite 433

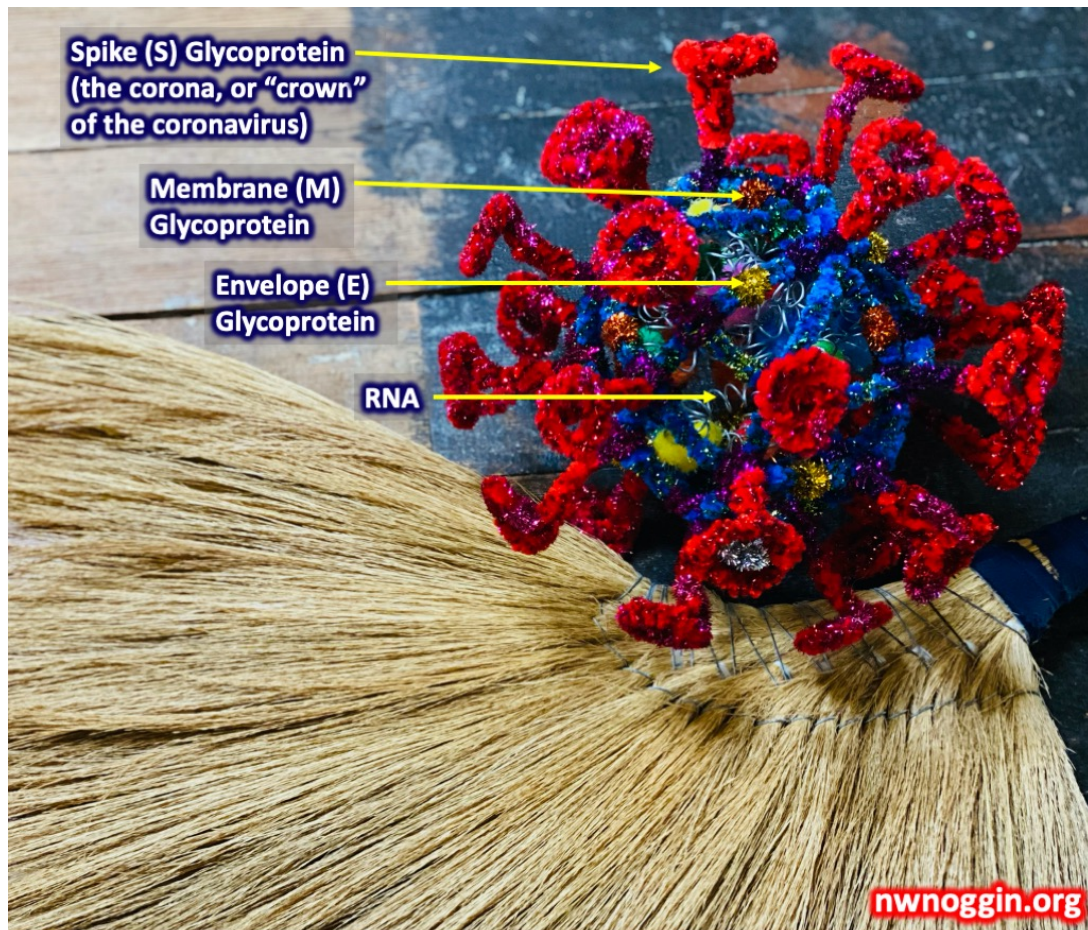
For more information about the applicable regulations please complete the required student module [Creating a Safe Campus](#) in your D2L.

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 has been working 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.



Protect your community: Get vaccinated

Vaccines developed with public investment in scientific research now safely defend millions from the SARS-CoV2 coronavirus & COVID-19.