Introduction to Neurophysiological Psychology (PSY 451)

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(Please use this email address; NOT Canvas)
Instructor Student Hours: ZOOM, by appointment
Maddy Monahan, **TA**; mmonahan@pdx.edu
TBD, **TA**;
TBD, **Graduate TA**,
TA Student Hours: ZOOM, Fridays

FALL HYBRID, September 28 – December 11, 2026

IN PERSON classes Wednesdays, 1:30 – 2:35pm

PSU campus, TBD

Online ZOOM classes Mondays, 1:30 – 2:35pm
Online TA ZOOM reviews Fridays, 1:30 – 2:35pm

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 based on 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). **AI use results in zero points.

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.

*** DEADLINES ARE IMPORTANT: Late work earns half credit. It's difficult in a large class to track late assignments, so after one week, ALL late assignments will be zeroed out. *No late assignments are accepted after Week Ten of term*.**

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) 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 (9/28 – 10/2): Introduction to Neurons and Glia

***MEET:** Zoom Monday**,** In Person Wednesday, Zoom Review Friday, 1:30 – 2:35pm
***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 (10/5 – 10/9): Resting potentials

***MEET:** Zoom Monday**,** In Person Wednesday, Zoom Review Friday, 1:30 – 2:35pm
***POST:** To Discussion Forum by 11:59pm Thursday; two responses due 11:59pm Sunday

- **QUIZ ONE AVAILABLE ONLINE 10/7 – 10/11**
- Introduction to the course, neurons, glia, resting potential

What do neurons do?, **Resting potential**, *How are neurons set up to carry information?*

WEEK THREE (10/12 – 10/16): Action potentials, and the synapse

***MEET:** Zoom Monday**,** In Person Wednesday, Zoom Class Friday, 1:30 – 2:35pm
***POST:** To Discussion Forum by 11:59pm Thursday; two responses due 11:59pm Sunday
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? 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, hormones; "classical" vs. "non-classical" neurotransmitters, modulatory neurotransmitters.

WEEK FOUR (10/19 – 10/23): Neurotransmitters

***NO CLASS WEDNESDAY (10/21): Outreach in Astoria, Oregon**
Outreach collaboration with TRIO in Astoria, Oregon
***MEET:** Zoom Monday**,** Zoom CLASS Friday, 1:30 – 2:35pm
***POST:** To Discussion Forum by 11:59pm Thursday; two responses due 11:59pm Sunday

- **QUIZ TWO AVAILABLE ONLINE 10/21 – 10/25**
- 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 (10/26 – 10/30): Basic brain structures and neocortex

*__MEET__: Zoom Monday, In Person Wednesday, Zoom CLASS Friday, 1:30 – 2:35pm
*__POST__: To Discussion Forum by 11:59pm Thursday; two responses due 11:59pm Sunday

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 (11/2 – 11/6): The auditory and visual system

*__MEET__: Zoom Monday, In Person Wednesday, Zoom Review Friday, 1:30 – 2:35pm
*__POST__: To Discussion Forum by 11:59pm Thursday; two responses due 11:59pm Sunday

- **QUIZ THREE AVAILABLE ONLINE 11/4 – 11/8**
- Neuropharmacology, basic brain organization, neocortex

Introduction to sensory systems, general stimulus aspects; Audition: physical features of the auditory stimulus (frequency, amplitude, complexity) vs. perceptual experiences of sound (pitch, loudness, timbre); ear anatomy (outer, middle, inner; pinna, tympanic membrane, ossicles, oval window, cochlea); structure and function (e.g., pinna size vs. frequency/amplitude detection); acoustic reflex; physiology of cochlea; inner/outer hair cells; stimulus transduction mechanism; frequency coding (tonotopy); physical coding of frequency, amplitude and complexity in the cochlea; central pathways for audition; Vision: eye, retina, photoreceptors, bipolar, horizontal, amacrine, ganglion cells, phototransduction (paradoxical "dark current"); central visual pathways, optimal stimuli, receptive fields

Methodology

WEEK SEVEN (11/9 – 11/13): Research techniques

***NO CLASS WEDNESDAY: Happy Veteran's Day!**

*__MEET__: Zoom Monday, Zoom Review Friday, 1:30 – 2:35pm
*__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

MIDTERM EXAM AVAILABLE ONLINE 11/13 – 11/22

WEEK EIGHT (11/16 – 11/20): Research techniques and Review

*__MEET__: Zoom Monday, In Person Wednesday, Zoom Review Friday, 1:30 – 2:35pm
*__POST__: To Discussion Forum by 11:59pm Thursday; two responses due 11:59pm Sunday

Imaging techniques & Genetic techniques: Pictures! Structural vs. functional techniques; in-depth examination of CAT, PET, MRI, fMRI, rsfcMRI, DTI, Western blots, knockout mice, in situ hybridization and more.

Current Topics in Neuroscience Research

WEEK NINE (11/23 – 11/27): Emotional regulation/feeling

***NO CLASS WEDNESDAY OR FRIDAY: Happy Thanksgiving!**

***MEET:** Zoom Monday, 1:30 – 2:35pm

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

- **QUIZ FOUR AVAILABLE ONLINE 11/25 – 12/2 (extra days ☺)**
- 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

WEEK TEN (11/30 – 12/4): Attention and "default"

***MEET:** Zoom Monday, In Person Wednesday, Zoom Review Friday, 1:30 – 2:35pm

***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)

REMINDER: NO LATE ASSIGNMENTS ACCEPTED AFTER WEEK TEN

FINAL EXAM

Online December 4 – 9th

(PLEASE NOTE: Maximum DRC extensions to Thursday 12/10)

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

PLEASE PUT ALL ASSESSMENT DATES ON YOUR CALENDAR NOW…

The final exam is scheduled for the **official final exam week at PSU**. You *MUST* be available during the official dates and times for the final exam, along with fellow students. The above date range will not be moved for any reason.

A REMINDER: We are 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.

Note that sometimes, for a myriad of reasons, life intervenes to create ongoing difficulties with class attendance, and meeting academic requirements. *In these cases, it's often best to withdraw from the course, and perhaps re-enroll at a less stressful time.*

Access and inclusion for students with disabilities

PSU values diversity, equity, and inclusion. Our goal is to create a learning environment that is accessible, equitable, inclusive, and welcoming. I am committed to fostering mutual respect and full participation for all students. If any aspects of instruction or course design result in barriers to your inclusion or learning, the Disability Resource Center (DRC) provides accommodations 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 DRC to schedule an appointment and initiate a conversation about reasonable accommodations. The DRC works with students who have physical, learning, cognitive, mental health, sensory, chronic illness, and all other disabilities.

If you already have accommodations: Please contact us to make sure that we have received your Faculty Notification Email, and to discuss your accommodations. The DRC is located in Smith Memorial Student Union, Suite 116. You can also contact the DRC at 503-725-4150, drc@pdx.edu, or visit the DRC website.

It can be challenging to do your best in class if you have trouble meeting basic needs like safe shelter, sleep, and nutrition. Resource centers across campus are here to provide assistance, referrals, and support. Please contact anyone on this list for assistance:

- Basic Needs Hub: email to connect with the basic needs hub basicneedshub@pdx.edu.
- Portland State Food Pantry: email to connect with the PSU food pantry pantry@pdx.edu.
- C.A.R.E. Program: email to connect with the CARE Program askdos@pdx.edu, or call (503) 725-4422.
- Student Health & Counseling: email to connect with student health and counseling askshac@pdx.edu, or call (503) 725-2800.

Mental health emergencies
If you are having a mental health emergency and need to speak with someone immediately, come into SHAC at any time during SHAC hours of operation. After hours and weekends call the Multnomah County Crisis Line 503-988-4888.

PSU CARES
Connects students with resources when they are experiencing distress or other concerns that might impact their personal or academic success.

- Make a referral to PSU CARES
- Call PSU CARES: 503-725-4422
- Email PSU CARES: askdos@pdx.edu

PSU desires to create a safe campus. As part of that mission, PSU requires all students to take the Understanding Sexual Misconduct and Resources learning module. If you or someone you know has been harassed or assaulted, you can find the appropriate resources on PSU's Sexual Misconduct Response website.

Title IX reporting statement
Students frequently come to us for assistance in matters not related to the course material. Please be aware that PSU's policies require instructors to report any instance of sexual harassment, sexual and relationship violence and/or other forms of prohibited discrimination to university officials, who will keep the information private. If you would rather share information about these matters with a PSU staff member who does not have these reporting responsibilities and can keep the information confidential, please use these campus resources:

- Connect with Confidential Advocates: 503-894-7982 or schedule online to talk with a Confidential Advocate (for matters regarding sexual harassment and sexual and relationship violence).
- Center for Student Health and Counseling: 1880 SW 6th Ave #200; 503-725-2800

Discrimination and Bias Incidents
The Office of Equity and Compliance (OEC) addresses complaints of discrimination, discriminatory Harassment, and sexual harassment against employees (faculty and staff). If you or someone you know believes they have been discriminated against, you may file a complaint. Someone from the OEC will contact you to discuss how to best address your complaint.

The Bias Review Team (BRT) gathers information on bias incidents that happen on and around campus, and gives resources and support to individuals who experience them. You can report a bias incident you experienced or learned about. A member of the BRT will contact you if you indicate you would like to be contacted.

Religious accommodations statement
If you would like to obtain religious accommodations, such as flexibility in attending evening courses or an extension on assignments, please contact your instructors. If you

need additional assistance, please contact the Office of the Dean of Student Life (DOSL) by emailing askdos@pdx.edu.

Cultural Resource Centers statement
Cultural Resource Centers (CRCs) create a student-centered, inclusive environment that enriches the university experience. They honor diversity, explore social justice issues, celebrate cultural traditions, and foster student identities, success, and leadership. They provide opportunities for student leadership, employment, and volunteering; student resources such as computer labs, event, lounge, and study spaces; and extensive programming. All are welcome!

- Multicultural Student Center
- La Casa Latina Student Center
- Native American Student and Community Center
- Pan African Commons
- Pacific Islander, Asian, and Asian American Student Center
- Middle East, North Africa, South Asia Student Center

Recordings in Zoom classes
We use technology for virtual meetings and recordings in this course. Use 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 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.