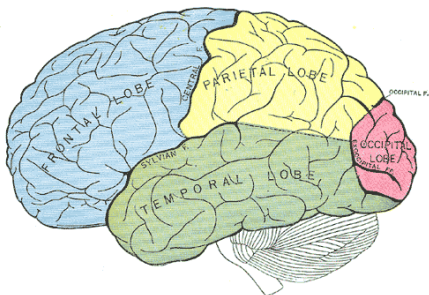


PSU Psychology 450: Psychopharmacology



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

TBD, **Graduate TA**,

Kirby Kahl, **Undergraduate TA**, kirbkahl@pdx.edu

Emma Marshall, **TA**, emarsh2@pdx.edu

Delnaz Taherkalateh, delnazt@pdx.edu

HYBRID SPRING TERM: March 30 – June 12, 2026

PREREQUISITES: None

ZOOM CLASSES meet ONLINE Mondays 1:30 – 2:35pm
IN PERSON CLASSES meet ON CAMPUS (FMH 230) Wednesdays, 1:30 – 2:35pm
TA Review ZOOM Sessions meet ONLINE meet Fridays 1:30 – 2:35pm

Office hours (Bill): ZOOM (by appointment)

Office hours (Grad TA): ZOOM (by appointment)

COURSE OBJECTIVES: For generations, people across the globe have used mind-altering chemicals, many derived from plants, for medicine, culturally significant ceremonies, and to influence cognition and mood. *Neuropsychopharmacology* is the study of how drugs affect the nervous system, and how drug actions alter physiology and behavior. The goal of this class is to introduce you to the structure and function of the nervous system, techniques used to study drug actions and effects, and the specific molecular and behavioral influence of alcohol and other drugs (including opioids, cocaine, methamphetamine, nicotine, caffeine, cannabinoids and LSD).

NO TEXTBOOK REQUIRED

STUDENT LEARNING OUTCOMES: The primary outcomes of this course are:

- (1) **DISCIPLINARY AND PROFESSIONAL EXPERTISE:** To acquire accurate, evidence-based knowledge of drug actions and effects, including relevant neural and genetic mechanisms, affected brain networks, developmental considerations, and techniques used in drug research.
- (2) **COMMUNICATION:** To interact with fellow undergraduates, teaching assistants and your instructor in a respectful, empathetic and constructive manner, and to communicate effectively through classroom activities and assignments.

- (3) **CREATIVE AND CRITICAL THINKING:** To investigate publicly funded drug research, current drug access and enforcement policies, and gain experience presenting and discussing complex brain and behavior related topics through examinations and art projects.
- (4) **ENGAGEMENT:** To consider the policy implications of drug research, and how research might better inform public K-12 educational efforts concerning the consequences of adolescent drug exposure, use and abuse.

GRADES: Grades are assigned on a 90+ (A), 80-89 (B), 70-79 (C) and 60-69 (D) point scale. **An A or B is an ABOVE AVERAGE grade, a C is AVERAGE, and a D is BELOW AVERAGE.** Points (a maximum of 105, which includes 5 points of extra credit) are awarded on the basis of your understanding of material as assessed by a midterm and a final exam. Additional points can be earned by answering questions on four online quizzes, participating in online discussion forums, and completing an art project. Students taking this course with the pass-fail option must maintain a C- average (70%) to receive a passing grade.

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

QUIZZES (20 points; 5 points each): Four quizzes will test your ability to recall and think critically about material presented during the previous few Zoom classes. **You will have a continuous, 30 minute session to complete each online quiz.**

DISCUSSION FORUMS (20 points, 2 points/forum): 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 150 words (300 max) and you must respond to TWO peers in at least 50 words. FORUM POSTS ARE DUE THURSDAYS (by 11:59pm); peer responses DUE by SUNDAY (by 11:59pm).**

ART PROJECT (20 points): Design a poster to educate adolescents about making good, evidence-based choices when it comes to taking risks with specific drugs (15 points). As part of this project, include a separate sheet explaining the reasons for your approach (5 points). Be sure to reference research that helped determine what you included and explain why you think your poster might be effective at influencing behavior. This project should be uploaded to Canvas in the form of a *.jpg or *.pdf file.

MIDTERM EXAM (20 points): The midterm will cover all the material presented in the class up to and including the lectures on behavioral pharmacology techniques. ***You will have one, continuous, hour-long session to complete the online midterm.***

FINAL EXAM (25 points): *The final exam will be comprehensive* but will draw more from lectures and Canvas resources presented *after* the midterm exam. ***You will have one, continuous, two hour-long session to complete the online final exam.***

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 please visit: http://www.ess.pdx.edu/OSA/osa_b.htm.

INCOMPLETES: Incompletes are rarely given, and are based on criteria described in the university catalog. **Incompletes are not appropriate when less than ¾'s of the course work has been scored.** No incomplete will be assigned without a written formal agreement and timeline related to course completion. The Office of the Registrar's website has [the full Incomplete Grades policy](#).

PLEASE DO NOT SHARE CLASS VIDEO OR AUDIO RECORDINGS: We will use technology for virtual meetings and recordings in this course. Our use of 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, including 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.

PLEASE NOTE: Life *clearly* has ups and downs, and everyone struggles sometimes with family, work, and other personal concerns and commitments. And not everyone experiences the world in the same way. If there is a serious, unexpected, sudden and significant emergency, please reach out. But also be aware that we strive to treat all students fairly, and that means each of you must think ahead and plan for when assignments are due. ***Everyone is subject to the same course expectations.***

THE CLASSES

Introduction to the nervous system:

WEEK ONE (3/30 – 4/3): Introductions

***MEET:** ZOOM Monday, IN PERSON Wednesday, ZOOM Friday, all 1:30 – 2:35pm

***POST:** Discussion FORUM by THURSDAY; student responses by SUNDAY

Course information, syllabus; what is neuropsychopharmacology?, what is a drug?, the nervous system (brain, spinal cord, peripheral nerves, CNS vs. PNS, autonomic, somatic; drug actions vs. effects, therapeutic vs. side effects, specific vs. non-specific effects, placebo effect; “central dogma” of biology, pharmacokinetics, “ADME,” drug administration methods, pharmacodynamics, drugs act on cells, what is a cell?, the cell membrane, protein targets (“protein machines”) in the nervous system; what are glial cells?

WEEK TWO (4/6 – 4/10): Electrical properties of neurons

***MEET:** ZOOM Monday, IN PERSON Wednesday, ZOOM Friday, all 1:30 – 2:35pm

***POST:** Discussion FORUM by THURSDAY; student responses by SUNDAY

Neuron structure/function, dendrites, soma, axons; excitable membranes and the resting potential; forces act on moving ions (currents): electric, concentration gradient, ATP-driven “pumps;” voltage gated Na⁺, K⁺ channels, action potential; importance of myelin; *How do neurons carry information?*; drug effects on the action potential

QUIZ

- QUIZ ONE (Pharmacokinetics, pharmacodynamics)
- Available 4/8 – 4/12

WEEK THREE (4/13 – 4/17): The chemical synapse – and brain!

***MEET:** ZOOM Monday, IN PERSON Wednesday, ZOOM Friday, all 1:30 – 2:35pm

***POST:** Discussion FORUM by THURSDAY; student responses by SUNDAY

Synapse types (electrical, chemical, various connections), synapse components, presynaptic release of neurotransmitter; *What is a language? What two forms of “language” does the nervous system use?*; autoreceptors, pre and postsynaptic receptors (ionotropic, metabotropic/GPCR), postsynaptic responses (EPSP’s, IPSP’s, spatial/temporal summation), 2nd messenger systems, biochemical cascades; cortex, lobes, sulci and gyri, white matter vs. gray matter, basal ganglia, cerebellum, brainstem, hypothalamus, thalamus, brain networks; *How are complex cognitive abilities organized in the brain?*

QUIZ

- QUIZ TWO (Resting potential, action potential, synaptic transmission)
- Available 4/15 – 4/19

WEEK FOUR (4/20 – 4/24): Neuropharmacology & neurotransmitters

***MEET:** ZOOM Monday, IN PERSON Wednesday, ZOOM Friday, all 1:30 – 2:35pm

***POST:** Discussion FORUM by THURSDAY; student responses by SUNDAY

Neurotransmitters, “classical” and “non-classical”; neurotransmitter synthesis, release, inactivation; agonists and antagonists, dose-response curves, ED-50 and TD-50, drug efficacy versus drug potency. *CONSIDER: How does the chemical synapse offer primary sites for drug action?*; Catecholamines, dopamine (DA) and norepinephrine (NE); synthesis, release, inactivation; DA pathways (nigrostriatal, mesolimbic, mesocortical), nigrostriatal link to Parkinson’s disease, DA receptors; NE pathway, receptors; Acetylcholine (ACh) and Serotonin (5-HT), ACh synthesis, release, inactivation; peripheral cholinergic systems (neuromuscular junction and autonomic nervous system), central cholinergic pathways (pontine, & basal forebrain), ACh receptors (nicotinic, muscarinic); Serotonin (5-HT) synthesis, release, inactivation; 5-HT pathways, receptors, importance for mood & psychological health; *How are the catecholamine, acetylcholine and serotonin systems similar? How do they differ?*

WEEK FIVE (4/27 – 5/1): Neuropharmacology & Drug Use Disorders

***MEET:** ZOOM Monday, IN PERSON Wednesday, ZOOM Friday, all 1:30 – 2:35pm

***POST:** Discussion FORUM by THURSDAY; student responses by SUNDAY

Amino Acid Neurotransmitters, glutamate is the primary excitatory brain neurotransmitter; GLU synthesis, release, inactivation; receptors (including ionotropic AMPA, kainate, NMDA); excitotoxicity; GABA is the primary inhibitory neurotransmitter in the brain, synthesis, release, inactivation, receptors; Drug Use Disorders, terminology, drug “addiction,” dependence, abuse, tolerance (“resistance”), withdrawal, risk potential of different drugs, traditional models of drug use disorders (two process, physical dependence, positive reinforcement, medical models (genetics versus exposure), new ideas

*Neuropsychopharmacology Methodology***WEEK SIX (5/4 – 5/8): Drug Research Techniques**

***GUEST LECTURE:** Zachary Papich, Neuroscience Graduate Program @ OHSU

***MEET:** ZOOM Monday, IN PERSON Wednesday, ZOOM Friday, all 1:30 – 2:35pm

***POST:** Discussion FORUM by THURSDAY; student responses by SUNDAY

Neuropharmacology techniques, stereotaxic surgery, lesioning, microinjection of drugs/chemicals, microdialysis, neuroelectrophysiological stimulation and recording, radioligand binding, receptor autoradiography, genetic engineering, “knockout” and transgenic animals, antisense, CRISPR, optogenetics, additional

QUIZ



techniques; Behavioral pharmacology techniques, animal testing, locomotor activity, analgesia (tail flick), learning/memory (T-maze, radial arm maze, Morris water maze, delayed recall), anxiety (elevated plus maze, light/dark crossing), fear (conditioned emotional response, fear-potentiated startle), reward (conditioned place preference, drug and electrical self-administration); *How do the techniques available to study drug effects on the nervous system limit the scientific questions we can ask?*

- **QUIZ THREE** (Brain organization, neuropharmacology/neurotransmitters)
- **Available 5/6 – 5/10**

*** MIDTERM EXAM

- Includes material up through Week Six; **Available Online 5/8 – 5/17**

Drugs

WEEK SEVEN (5/11 – 5/15): Alcohol and Opioids

***MEET**: ZOOM Monday, IN PERSON Wednesday, ZOOM Friday, all 1:30 – 2:35pm

***POST**: Discussion FORUM by THURSDAY; student responses by SUNDAY

Alcohol, psychopharmacology, mechanisms of action, behavioral and physiological effects, alcohol use disorder; *How does alcohol use vary among different cultural groups? Between different families? Among people at different ages? What do these differences suggest about societal/legal approaches to alcohol use/use disorders?*; Opioids, narcotic analgesics; receptors and endogenous neuropeptides; opioids and pain; Oxycontin, Vicodin, opioid crisis; *How can we balance the need to reduce suffering and pain with the known risks of these substances?*

WEEK EIGHT (5/18 – 5/22): PSYCHOSTIMULANTS

***MEET**: ZOOM Monday, IN PERSON Wednesday, ZOOM Friday, all 1:30 – 2:35pm

***POST**: Discussion FORUM by THURSDAY; student responses by SUNDAY

Psychostimulants, cocaine, amphetamine, methamphetamine; psychopharmacology, mechanisms of action, behavioral and physiological effects; amphetamine psychosis; *What is lost with the hijacking of mesolimbic dopamine network by drugs such as meth?*; Nicotine and caffeine, nicotine psychopharmacology and smoking; caffeine psychopharmacology, mechanisms of action, behavioral & physiological effects; *How are nicotine and caffeine similar? How do they differ? How would you discuss effects and actions of these two drugs with adolescents exposed to both?*

WEEK NINE (5/25 – 5/29): Review and Catch Up

***NO CLASS MONDAY: Happy Memorial Day**

*** NO CLASS WEDNESDAY!**

***MEET: ZOOM Friday, 1:30 – 2:35pm**

***POST: Discussion FORUM by THURSDAY; student responses by SUNDAY**

***** ART PROJECT DUE 5/31****WEEK TEN (6/1 – 6/5): CANNABIS & PSYCHEDELICS**

***MEET: ZOOM Monday, IN PERSON Wednesday, ZOOM Friday, all 1:30 – 2:35pm**

***POST: Discussion FORUM by THURSDAY; student responses by SUNDAY**

Psychedelics/"hallucinogens" (mescaline, psilocybin, DMT, LSD), pharmacology of hallucinogenic drugs, mechanisms, physiological and perceptual/behavioral effects; therapeutic potential (depression, anxiety); *What is the evidence for the therapeutic benefits of these substances? Why is the use of psychedelics often associated with religious/spiritual ceremonies;* Cannabis, cannabinoid pharmacology, mechanisms of action, endogenous cannabinoids, effects, acute vs. chronic exposure; *How do you feel about federal marijuana laws? How does knowledge of cannabinoid psychopharmacology influence your views?*

- **QUIZ FOUR (DRUGS)**
- **Available 6/3 – 6/7**

**** FINAL EXAM**

Scheduled for FINALS WEEK; Available 6/5 – 6/10

***** No DRC extensions beyond 6/11**

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.



QUIZ

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 Avenue #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](#)