

PSY 456
Advanced Lecture/Laboratory in Behavioral Neuroscience
Fall 2023

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Required Text: Nestler, Kenny, Russo & Schaefer, *Molecular Neuropharmacology: A Foundation for Clinical Neuroscience*, McGraw-Hill, 2020, Fourth Edition.

Meeting Times: Lecture: MWF 9:00-9:50, Jacob Science Bldg, Room 203
Laboratory:
Section 001, T 9:00-10:50, MDS 155A
Section 002, T 11:00-12:50, MDS 155A

Course Description: This course is an advanced course that provides an in-depth coverage of the basic neural mechanisms that underlie behavior, with particular emphasis on both anatomical and pharmacological perspectives. Although our ultimate goal is to understand the neuropharmacological mechanisms of human behavior, we will rely heavily on examples from animal experimentation in order to reach that goal. In many cases, our understanding of human behavior is a direct consequence of controlled laboratory work with non-human animals. This approach using animal models will be evident in both the lecture and laboratory portions of the course.

Although we will concentrate primarily on the neural mechanisms of normal behavior, we will also encounter examples of abnormal human behavior that provide excellent models by which our knowledge about the inner workings of the brain are advanced. Also, we will explore the various types of biological and neuropharmacological treatments which might be used to treat abnormal behavior.

This course fulfills the advanced lecture/laboratory option for psychology majors. The prerequisites required for the course are PSY 215, 216, 312, and BIO 103 (or equivalent). One year of chemistry is desirable, but not required.

Student Learning Objectives: It is assumed that you have a basic knowledge of the breadth of the discipline of psychology and a reasonable command of the skills taught in PSY 215, PSY 216 and PSY 312. This course builds upon that knowledge. By the end of this course, you should improve in your abilities to:

1. Critically evaluate scientific research.
2. Identify and evaluate the implications of theory for research and vice versa.

3. Identify the implications for application of both theory and research findings.
4. Use evidence to support your reasoning and to evaluate the reasoning of others.
5. Generate and execute a research study.
6. Communicate effectively in writing and speaking.

In addition, students who complete this course will learn the following specific objectives:

1. Understand the basic principles of neuroanatomy, neurophysiology and neuropharmacology that apply to brain function.
2. Understand the relation between these basic brain mechanisms in the control of human behavior.
3. Develop an understanding about how diseases of the brain are manifest in human behavior and how these disease states may be treated biologically.
4. Develop knowledge about how basic research in laboratory animals is translated into useful information for advancing our understanding of human behavior.
5. Perform a simple experiment which (1) tests a hypothesis in the field of behavioral neuroscience, (2) provides data to write a scientific laboratory report, and (3) requires an exploration and critical evaluation of published scientific literature.

Graduation Composition and Communication Requirement (GCCR)

Psychology majors may satisfy the GCCR by taking a lecture/lab course in Psychology and earning an average grade of C or better on the GCCR assignments in the class. The courses that may be used to meet the GCCR are: PSY 427, PSY 430, PSY 440, PSY 450, PSY 456, PSY 460, or PSY 552. This course provides full GCCR credit for the Psychology major.

The GCCR requirements include:

1. a writing component;
2. either a formal oral assignment or a visual assignment or both;
3. an assignment demonstrating information literacy in the discipline;
4. a draft/feedback/revision process on GCCR assignments

For this course, the writing requirement will be met by the lab report that you submit on the research project at the end of the semester. This lab report should be approximately 15 pages long, including title page, figures, tables and references. The oral component will be met by the in-class debates (dates are noted in the syllabus and instructions will be handed out in class). In you choose to hand in a draft of the paper before the due date, Dr. Bardo and the TA will give you feedback on the paper. You would then revise the paper based on the feedback, and submit a completed version as the final paper. The lab report should include at least eight published empirical studies related to your project (i.e., the information literacy component). The final paper is due on the Friday prior to Final Exam Week.

Grades: Grades will be assigned based upon performance in both the lecture and laboratory portions of the course according to the following breakdown:

<u>Lecture Points</u>	Exam 1	75 points
	Exam 2	75 points
	Exam 3	75 points
	Exam 4	75 points
	Debate	50 points
<u>Laboratory Points</u>	Practicum	75 points
	Lab Report	75 points
<u>TOTAL</u>		<u>500 points</u>

At the end of the course, the points from both the lecture and laboratory portions of the course will be totaled and a single overall grade will be assigned as follows:

Total Points	Grade
450-500	A
400-449	B
350-399	C
300-349	D
Below 300	E

Based on the overall performance of the class, this grading scale may be curved downward so that at least 15% of students receive an A and 25% receive B.

For the lecture exams, material covered in both the lecture and text will be included. The format of these exams will consist of objective (definitions) and essay-type questions. These exams will be completed during the 50-minute class period. Make-up examinations are to be arranged with the instructor and will be scheduled during Prep Week (Dec 4-6).

In the lecture, we will also have a series of 4 different in-class debates on a controversial topic (e.g., the pros and cons of using Ritalin in children). Students will be assigned to a debate team consisting of 4 members each. Two teams will prepare and present brief arguments during the 50-min class period. Students who have more than one unexcused absence from the debate class will lose 10 points from their grade.

The laboratory practicum exam will consist of identifying anatomical structures in sheep, rat and human brain materials provided in the laboratory. This exam will be conducted during the laboratory portion of the course. For studying the sheep and human brains, various atlases are available on the internet.

There will be a laboratory report, written in APA style, that summarizes the results of an experiment conducted in the laboratory portion of the course. Late lab reports will lose 5 points for each day late.

While you are strongly encouraged to attend both lectures and labs in person, attendance is not a formal part of your grade. All lectures will be posted on Canvas as Echo 360 recordings, but laboratories will not be recorded due to the hands-on nature of the material.

Academic Policy Statement: All official academic policies that apply to this course can be found at the following link: <https://www.uky.edu/universitysenate/acadpolicy>

Excused Absence: *Senate Rules 5.2.5.2.1* defines the following as acceptable reasons for excused absences: (a) significant illness, (b) death of a family member, (c) trips for members of student organizations sponsored by an educational unit, trips for University classes, and trips for participation in intercollegiate athletic events, (d) major religious holidays, (e) interviews for graduate/professional school or full-time employment post-graduation, and (f) other circumstances found to fit “reasonable cause for nonattendance” by the instructor of record. Students should notify the professor of absences prior to class when possible.

Accommodation Due to Disability: In accordance with federal law, if you have a documented disability that requires academic accommodations, please inform your instructor as soon as possible during scheduled office hours. In order to receive accommodations in a course, you must provide your instructor with a Letter of Accommodation from the Disability Resource Center (DRC). The DRC coordinates campus disability services available to students with disabilities. It is located on the corner of Rose Street and Huguelet Drive in the Multidisciplinary Science Building, Suite 407. You can reach them via phone at (859) 257-2754, [via email \(drc@uky.edu\)](mailto:drc@uky.edu) or visit their [website \(uky.edu/DisabilityResourceCenter\)](http://uky.edu/DisabilityResourceCenter). DRC accommodations are not retroactive and should therefore be established with the DRC as early in the semester as is feasible.

Inclement weather: If the class period of a scheduled exam is cancelled due to inclement weather, the exam will be rescheduled for the next class meeting

Academic Integrity: Per university policy, students shall not plagiarize, cheat, or falsify or misuse academic records. Students are expected to adhere to University policy on cheating and plagiarism in all courses. The minimum penalty for a first offense is a zero on the assignment on which the offense occurred. If the offense is considered severe or the student has other academic offenses on their record, more serious penalties, up to suspension from the university may be imposed.

Plagiarism and cheating are serious breaches of academic conduct. Each student is advised to become familiar with the various forms of academic dishonesty as explained in the Code of Student Rights and Responsibilities. A plea of ignorance is not acceptable as a defense against the charge of academic dishonesty. Complete information can be found at the following website: <https://www.uky.edu/universitysenate/ao>

Class Recording Notification

The University of Kentucky Student Code of Conduct defines Invasion of Privacy as using electronic or other devices to make a photographic, audio, or video record of any person without their prior knowledge or consent when such a recording is likely to cause injury or distress.

Meetings of this course may be recorded. All video and audio recordings of lecturers and class meetings, provided by the instructors, are for educational use by students in this class only. They are not to be copied, shared, or redistributed.

As addressed in the Student Code of Conduct, students are expected to follow appropriate

university policies and maintain the security of linkblue accounts used to access recorded class materials. Recordings may not be reproduced, shared with those not enrolled in the class, or uploaded to other online environments.

If the instructor or a University of Kentucky office plans any other uses for the recordings, beyond this class, students identifiable in the recordings will be notified to request consent prior to such use and may be asked to complete an “authorization of use” form by a faculty member.

Video and audio recordings by students are not permitted during the class unless the student has received prior permission from the instructor. Any sharing, distribution, and or uploading of these recordings outside of the parameters of the class is prohibited. Students with specific recording accommodations approved by the Disability Resource Center should present their official documentation to the instructor.

All content for this course, including handouts, assignments, and lectures are the intellectual property of the instructors and cannot be reproduced or sold without prior permission from the instructors. A student may use the material for reasonable educational and professional purposes extending beyond this class, such as studying for a comprehensive or qualifying examination in a degree program, preparing for a professional or certification examination, or to assist in fulfilling responsibilities at a job or internship.

Statement on Diversity, Equity and Inclusion: The University of Kentucky is committed to our core values of diversity and inclusion, mutual respect and human dignity, and a sense of community ([Governing Regulations XIV](#)). We acknowledge and respect the seen and unseen diverse identities and experiences of all members of the university community (<https://www.uky.edu/regs/gr14>). These identities include but are not limited to those based on race, ethnicity, gender identity and expressions, ideas and perspectives, religious and cultural beliefs, sexual orientation, national origin, age, ability, and socioeconomic status. We are committed to equity and justice and providing a learning and engaging community in which every member is engaged, heard, and valued.

We strive to rectify and change behavior that is inconsistent with our principles and commitment to creating a safe, equitable, and anti-racist environment. If students encounter such behavior in a course, they are encouraged to speak with the instructor of record or the [college's diversity officer](#), who is charged with addressing concerns about diversity, equity, and inclusiveness (uky.edu/inclusiveexcellence/college-diversity-inclusion-officers). Students may also contact a faculty member within the department, program director, the director of undergraduate or graduate studies, the department chair, or the dean. To submit an official report of bias, hatred, racism, or identity-based violence, visit the Bias Incident Support Services at the following link: <https://www.uky.edu/biss/report-bias-incident>

LECTURE SCHEDULE AND READINGS

AUG 21, 23

Basic Principles of Pharmacology

- Chap 1

AUG 25, 28

Cellular Communication

- **Chap 2** (skip Tables 2-1, 2-3 and 2-4; skip Fig 2-13; skip Cyclic Nucleotide-Regulated channels, TRP channels and chloride channels on pages 50-53).

AUG 30

Synaptic Transmission (con't)

- **Chap 3** (skip Table 3.2)

SEPT 1

No Lecture

MON SEPT 4 LABOR DAY

SEPT 6

Synaptic Transmission (con't)

- **Chap 3** (skip Table 3.2)

SEPT 8, 11

Signal Transduction (this chapter is very dense, concentrate on lecture)

- **Chap 4** (skip all Tables 4-1 through 4-9; skip Neurotrophic Factor-Regulated Protein Phosphorylation Cascades on pages 102-108; and skip Regulation of Gene Expression Signals on pages 115-123, except do read about CREB on pages 117-119)

WED SEPT 13 EXAM 1

SEPT 15, 18, 20

Amino Acids

- **Chap 5** (skip Glycine on pages 153-156)

SEPT 22, 25, 27

Monoamines and Acetylcholine

- **Chap 6** (skip Tables 6.2, 6.3, 6.4, 6.5, 6.6 and 6.7; skip Histamine and Orexins on pages 188-193)

SEPT 29 and OCT 2

Neuropeptides, Other Transmitters

- **Chap 7** (skip Figures 7-3, 7.4 and 7-7; skip Tables 7-2 and 7-4)
- **Chap 8** (skip Purines on pages 216-222; skip Table 8-3; skip CNTF, VEGF, Neuregulin and VGF on pages 236-237; skip Chemokines on pages 240-241)

WED OCT 4 EXAM 2

OCT 6, 9**Autonomic Nervous System**

- **Chap 9** (skip Disorders of the Autonomic Nervous System on pages 259-263; skip Tables 9-1, 9-2, 9-3, 9-4)

OCT 11, 13**Neuroendocrine System**

- **Chap 10** (skip Hypothalamic-Pituitary-Thyroid Axis on pages 272-276; skip Box 10-4)

OCT 16, 18**Pain**

- **Chap 11** (skip Figure 11-11; skip Table 11-1; skip Boxes 11-1, 11-2 and 11-3)

OCT 20**Sleep**

- **Chap 13** (skip Figure 13-7)

MON OCT 23 FALL BREAK**OCT 25****Sleep (con't)**

- **Chap 13** (skip Figure 13-7)

FRI OCT 27 EXAM 3

OCT 30 and Nov 1**Cognition and Memory**

- **Chap 14**

NOV 3, 6**Emotion**

- **Chap 15** (skip Table 15-4)

NOV 8, 10 (SHAYKIN)**Reinforcement and Addiction**

- **Chap 16**

NOV 13, 15, 17, 20 IN-CLASS DEBATES**NOV 22 and 24 THANKSGIVING****NOV 27, 29 and DEC 1****Psychopathology**

- **Chap 17** (skip Lithium and Other Mood Stabilizing Drugs on pages 462-464)

DEC 4 and 6 PREP WEEK (MAKE-UP EXAMS and LAB REPORTS)**Mon DEC 11 (8:00 AM) EXAM 4**

LABORATORY SCHEDULE

Date	Topic
Aug 29	Surface Structures (sheep, human and rat)
Sept 5	Midline Structures (sheep, human and rat)
Sept 12	Coronal Structures (sheep, human and rat)
Sept 19	Horizontal Structures (sheep, human and rat)
Sept 26	Full Review
Oct 3	Practice Exam and Optional Time with Koby
Oct 10	<u>PRACTICUM EXAM</u>
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Oct 17	Overview of Experiment and Bioethics
Oct 24	FALL BREAK (NO LAB MEETING)
Oct 31	Methods, Instructions on video tapes, APA style
Nov 7	Score Video Tapes (NO LAB MEETING)
Nov 14	Data Analysis and Scientific Graphing
Nov 21	Work on Laboratory Report (NO LAB MEETING)
Nov 28	Work on Laboratory Report (NO LAB MEETING)
Dec 5	Prep Week (feedback on lab report drafts)
<u>Dec 8 (Fri, 5 PM)</u>	<u>LAB REPORTS DUE</u>