PSY 456
Advanced Lecture/Laboratory in Behavioral Neuroscience
Fall 2020

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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, Whitehall Classroom Bldg, Room 106
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 requirement 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 100, PSY 215 and PSY 216. 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). A draft of the lab report should be given to the Teaching Assistant at least one week prior to the due date. The TA will give you feedback on the paper. You should 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:

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

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.

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.

Excused Absences: Students need to notify the instructor of absences prior to an exam when possible. S.R. 5.2.4.2 defines the following as acceptable reasons for excused absences: (a) serious illness, (b) illness or death of family member, (c) University-related trips, (d) major religious holidays, and (e) other circumstances found to fit “reasonable cause for

nonattendance" by the instructor. Senate Rule 5.2.4.2 states that faculty have the right to request "appropriate verification" when students claim an excused absence because of illness or death in the family. Notification of absences due to university-related trips is required prior to the absence.

Students anticipating an absence for a major religious holiday are responsible for notifying the instructor in writing of anticipated absences due to their observance of such holidays no later than the last day in the semester to add a class. Information regarding dates of major religious holidays may be obtained through the religious liaison, Mr. Jake Karnes (859-257-2754).

Accommodation Due to Disability: If you have a documented disability that requires academic accommodations, please see me as soon as possible. In order to receive accommodations in this course, you must provide me with a Letter of Accommodation from the Disability Resource Center (Room 2, Alumni Gym, 257-2754, email address: jkarnes@email.uky.edu) for coordination of campus disability services available to students with disabilities.

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. Complete information can be found at the following website: http://www.uky.edu/Ombud. A plea of ignorance is not acceptable as a defense against the charge of academic dishonesty. It is important that you review this information as all ideas borrowed from others need to be properly credited.

Part II of *Student Rights and Responsibilities* (available online http://www.uky.edu/StudentAffairs/Code/part2.html) states that all academic work, written or otherwise, submitted by students to their instructors or other academic supervisors, is expected to be the result of their own thought, research, or self-expression. In cases where students feel unsure about the question of plagiarism involving their own work, they are obliged to consult their instructors on the matter before submission.

When students submit work purporting to be their own, but which in any way borrows ideas, organization, wording or anything else from another source without appropriate acknowledgement of the fact, the students are guilty of plagiarism. Plagiarism includes reproducing someone else's work, whether it be a published article, chapter of a book, a paper from a friend or some file, or something similar to this. Plagiarism also includes the practice of employing or allowing another person to alter or revise the work which a student submits as his/her own, whoever that other person may be.

Students may discuss assignments among themselves or with an instructor or tutor, but when the actual work is done, it must be done by the student, and the student alone. When a student's assignment involves research in outside sources of information, the student must carefully

acknowledge exactly what, where and how he/she employed them. If the words of someone else are used, the student must put quotation marks around the passage in question and add an appropriate indication of its origin. Making simple changes, while leaving the organization, content and phraseology intact, is plagiarism. However, nothing in these Rules shall apply to those ideas which are so generally and freely circulated as to be a part of the public domain (Section 6.3.1).

Covid-19 Guidance:

Face Covering/Distancing Policy

- In accordance with University guidelines, students must wear UK-approved face coverings in the classroom and academic buildings (e.g., faculty offices, laboratories, libraries, performance/design studios, and common study areas where students might congregate). If UK-approved face coverings are not worn over the nose and mouth, students will be asked to leave the classroom.
- Students should complete their daily online wellness screening before accessing university facilities and arriving to class.
- Students should not move chairs or barriers in classrooms and should socially distance at all times, leaving a six (6) foot radius from other people. Masks and hand sanitizer can be found in the Whitehall Classroom building if needed.
- Students should leave enough space when entering and exiting a room. Students should not crowd doorways at the beginning or end of class.
- The instructor may choose to remove a mask when pedagogically necessary at the front of the classroom and behind a clear barrier. The instructor's mask will be replaced when it is no longer necessary to have it removed, or when the class meeting is complete.

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 available only through the Canvas shell for this course and 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. In anticipation of such cases, students 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.

LECTURE SCHEDULE AND READINGS

AUG 17, 19, 21
Basic Principles of Pharmacology
- **Chap 1**

AUG 24, 26
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 28, 31
Synaptic Transmission
- **Chap 3** (skip Table 3.2)

SEPT 2, 4, 7
Signal Transduction (this chapter is very dense)
- **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 9 EXAM 1

SEPT 11, 14
Amino Acids
- **Chap 5** (skip Glycine on pages 153-156)

SEPT 16, 18, 21
Acetylcholine and Monoamines
- **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 23, 25, 28
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 SEPT 30 EXAM 2

OCT 2, 5
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 7, 9
Neuroendocrine System
- **Chap 10** (skip Hypothalamic-Pituitary-Thyroid Axis on pages 272-276; skip Box 10-4)

OCT 12, 14
Pain
- **Chap 11** (skip Figure 11-11; skip Table 11-1; skip Boxes 11-1, 11-2 and 11-3)

OCT 16, 19
Sleep
- **Chap 13** (skip Figure 13-7)

WED OCT 21 EXAM 3

OCT 23, 26
Cognition and Memory
- **Chap 14**

OCT 28, 30
Emotion
- **Chap 15** (skip Table 15-4)

NOV 2, 4, 6
Reinforcement and Addiction
- **Chap 16**

NOV 9, 11
Psychopathology
- **Chap 17** (skip Lithium and Other Mood Stabilizing Drugs on pages 462-464)

NOV 13 EXAM 4

NOV 16, 18, 20, 23 IN-CLASS DEBATES

LABORATORY SCHEDULE

Date	Topic
Aug 18	Orientation
Aug 25	Surface Structures (sheep and rat)
Sept 1	Midline Structures (sheep and rat)
Sept 8	Coronal Structures (sheep and rat)
Sept 15	Horizontal Structures (sheep and rat)
Sept 22	Full Review
Sept 29	Practice Exam
Oct 6	**PRACTICUM EXAM**
Oct 13	Overview of Experiment
Oct 20	Methods and Ethics in Biomedical Animal Research
Oct 27	**NO LAB MEETING** (Conduct Experiment)
Nov 3	**NO LAB MEETING** (Score Video Tapes)
Nov 10	APA style, Literature Searching
Nov 17	Data Analysis and Scientific Graphing
Nov 24	Work on Laboratory Report
Dec 2 (Wed, 5 PM)	**LAB REPORTS DUE**