NSC 4363—Neuropharmacology—Spring 2013

CN 1.120 Tues-Thurs 1:00–2:15 PM

Professor	**Dr. Tres Thompson**	tres@utdallas.edu JO 4.310 972-883-4933	http://www.utdallas.edu/~tres Office hours: Thurs. 3 – 4:30 PM (other times by email appt.)
Grad. T.A.	**Shaurabh Nandy**	shaurabh@utdallas.edu GR 4.302	Office hours: Fri. 2:30-4 pm, (other times by email appt.)
Undergrad. T.A.s	**Alisa Bovda** **Sewar Naja** **Ryan Reynolds**	**Dozie Uzoma** **Shawn Willett** **Amy Zwierzchowski**	Your undergrad TAs will regularly monitor eLearning discussion boards, and each will hold weekly reviews at multiple times to fit busy schedules

Prerequisite: NSC 4352 or NSC 4354

Course Description: The neurobiology of CNS and peripheral neurotransmission. A survey of neurotransmitter functions with special emphasis on effects in the central nervous system. Emphasis is on receptor theory and neurochemistry, but neurotransmitter metabolism and release are also considered. Correlations between neurotransmitter activity and behavior and pathological states are discussed where appropriate. Includes ionotropic and metabotropic coupling of all known classes of receptors to both their cellular and systemic effects. Clinical efficacy, side effects, and other issues related to drug use and abuse are covered.

The course introduces and discusses in depth three major areas of neuropharmacology: (1) the bioavailability of compounds that we class as drugs (i.e. those compounds with receptor mediated actions); (2) the cellular mechanisms that produce drug actions in the nervous system and its targets; (3) specific drug effects (and side-effects), divided topically by receptor type. Agonist, antagonist, and mixed effects will be discussed and analyzed from the molecular to the behavioral level, stressing experimental and clinical uses.

Student Learning Objectives: After completing the course, students should be better able to:

1.1 Describe and analyze major concepts, theoretical perspectives, empirical findings, and historical trends in neuroscience.

1.3 Integrate pathological findings from psychology, psychiatry, physiology, or clinical neurology with basic scientific work in the neurosciences.

1.4 Use proper scientific terminology for neurotransmitters, neurotransmitter receptors, and neurotransmitter receptor/effector signalling systems.

1.5 Assess interactions of specific ligands (drugs) with specific neurotransmitter systems.

1.6 Distinguish between ionotropically and metabotropically-mediated pharmacological effects.

3.3 2.4 Describe how current methods sometimes limit our understanding of the nervous system, and drive innovation to develop new and better techniques.

3.4 Identify appropriate applications of neuroscientific knowledge in the health, service, education, or business professions.

4.3 Demonstrate how neuroscience can contribute to understanding behavioral and social issues and aid public policy.

I do not own copyright to the graphics used in lectures, so I will NOT post my PowerPoint slides online. Indeed, empirical research clearly demonstrates that humans remember information best if they write it down themselves, rather than passively view it (i.e. this actively engages more brain systems in learning), so take good notes in class. You CAN post your own typed/written notes for sharing / questions / clarification etc. on eLearning! Posting PHOTOS of lecture slides is prohibited.

Texts: *Cellular & Molecular Neurophysiology* (Hammond), 3rd ed. **[H].**

Molecular Neuropharmacology (Nestler et al.), 2nd Ed. [**N**]

old (non-updated) copies of classnotes are posted as an aid at*:*
http://www.utdallas.edu/~tres/pharm/neurop_read.html

The texts and older notes serve as background material for class lectures and discussion, but new material is presented in lectures. Neuropharmacology is a rapidly advancing field, and as neuroscience students you must strive to keep up with the current state of the field.

Exams: There are 3 comprehensive exams plus a comprehensive final. Unique material for these exams will be taken from class lectures and discussion, so **regular timely attendance is very strongly advised**. The format of the exam questions is challenging and encourages integrative thought about the material; i.e. it rewards an understanding of pharmacology, not mere memorization. Matching, fill-in-the-blank, short answer, diagrams, true-false, and multiple-choice questions may be used (75 points per exam, for a total of 300 points for the semester). **NO extra credit assignments may or should be requested**.

Grading Policy: Grading is based on exam performance, using *a priori* criteria: 90% correct for A's, 80% for B's, 67% for C's, and 55% for D's, with total number of points summed across the course. Plus/minus grades will be determined by point distributions within your class. Please do not ask for extra credit assignments or special favoritism on grading.

Course Policies:

• Class lectures & discussions begin promptly, so lateness is rude to all.

• Failing to attend this class regularly penalizes only one person: you. Experience indicates lecture attendance strongly correlates with grades.

• Excused absences for exams are given **ONLY** if: (a) you are seriously ill and have verifiable documentation from a physician, or (b) you were legally detained at the exam time or (c) you made prior arrangements to attend a verifiable religious or family event [no other routine exceptions]. **In all cases** except (b) you **must notify the instructor IN ADVANCE of the scheduled exam by email**. Failing to do so, you will receive a zero (0) for that exam. A **maximum** extension of one week (7 days) beyond the scheduled exam date can be granted, except for the final exam, which must be taken on or by the final exam date.

• **Cell/smartphone use/video recording/photography are prohibited**.

• Grades will be posted on eLearning, and exams will be discussed in class in a timely fashion to give you feedback for future study. Your instructor will answer questions in class, and after. Your T.A. will have all exams available during office hours to review, but all remain the property of the instructor. Exam questions cannot be transcribed or copied for use outside of these TA office hours.

Class schedule

(subject to change at the discretion of the instructor, or the dictates of Texas weather)

Date	Topic	Read Chapters
Jan. 15	Introduction to neuropharmacology	(H1-3)
17	Pharmacokinetics and pharmacodynamics	N1
22	Presynaptic events and neurotransmitter release	N3; H7
24	Receptors and receptor binding	H6, 7
29	Signal transduction: G-proteins	N4
31	Signal transduction: 2nd messengers I	N4
Feb. 5	Signal transduction: 2nd messengers II	N4
7	**Exam I:** Basic concepts in neuropharmacology	
12	Voltage-gated ion channels I	H4, 15; N2
14	Voltage-gated ion channels II	H5, 16; N2
19	Voltage-gated ion channels III	H13, 14; N2
21	Glutamate receptors I: AMPA/KA-Rs	N5; H10
26	Glutamate receptors II: NMDA-Rs (NRs)	N5; H10
28	Inhibitory amino acids I: Glycine-Rs, $GABA_A$-Rs, $GABA_C$-Rs	N5; H9
Mar. 5	Cholinegic receptors I: Nicotinic-Rs	N6, 9; H8
7	**Exam II:** Ionotropic neuropharmacology	
12,14	**SPRING BREAK**	
19	Glutamate receptors III: mGluRs	N5; H12
21	Inhibitory amino acids II: $GABA_B$-Rs	N5; H11
26	Cholinegic receptors II: Muscarinic-Rs	N6, 9; H14
28	Biogenic amines I: catecholamines I: dopamine	N6, 16
Apr. 2	Biogenic amines II: catecholamines II: NE, EPI	N6
4	Biogenic amines III: indolamines	N6
9	Biogenic amines IV: histamine, orexin	N6
11	**Exam III:** Metabotropic neurotransmitters	
16	Steroids & peptide hormones	N7, 10
18	Adenosine & other analogs	N8
23	Anesthetics & alcohol	N5, 15
25	Opiates & anti-inflammatories	N7, 11, 15
30	Other drugs of abuse	N15
May 2	**FINAL EXAM REVIEW**	
9	**Final exam (Comprehensive)**	11 am – 12:30 pm

The information contained in the following link constitutes the University's policies and procedures segment of the course syllabus:

Please go to http://go.utdallas.edu/syllabus-policies for these policies.