NSC 4363—Neuropharmacology—Spring 2014

FN 2.102 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. 2:30 – 3:45 PM (other times by email appt.)
Grad. T.A.:	**Erica Underwood**	erica.underwood@utdallas.edu JO 4.312	Office hours: Tues & Thurs 2:15-3 pm, (other times by email appt.)
Undergrad. T.A.s:	**Michael Garcia** **Nirali Mithal** **Golnaz Sadeghiani** **Katelyn Sheehy**	mxg123530@utdallas.edu nxm101320@utdallas.edu gxs122330@utdallas.edu kes102120@utdallas.edu	Your undergrad TAs will monitor eLearning discussion boards regularly. Each holds weekly reviews (suggested) 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 emphasis on effects in the central nervous system. Covers receptor theory, neurochemistry, neurotransmitter metabolism and release. Relationships between neurotransmitter activity and behavioral and pathological states are discussed where appropriate. Includes ionotropic and metabotropic coupling of 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 both 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 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.

NOTE: ***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, and rewrite it soon thereafter in more detail, rather than passively view or listen to it (i.e. this actively engages more brain systems involved in learning & memory), so take good notes in class. Posting PHOTOS or diagrams of these lecture slides on eLearning 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 rote 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, 77% for B's, 65% for C's, and 50% 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 begin promptly. Coming late/leaving early or 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.

• Please **turn off your phone's ringer**, and **refrain from web surfing**. Watching videos/texting/gaming must be on your own time, not in class.

•Photography / videography is strictly prohibited in class.

• Grades are posted on eLearning, and exams discussed in a timely manner to give you feedback for future study. Your T.A. has all exams to review during office hours, but all exam materials remain the property of the instructor. **Exams cannot be transcribed or copied** for use outside of your TA's office hours.

Class schedule

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

Date	Topic	Read Chapters
Jan. 14	Introduction to neuropharmacology	(H1-3)
16	Pharmacokinetics & pharmacodynamics	N1
21	Presynaptic events & neurotransmitter release	N3; H7
23	Receptors & receptor binding	H6, 7
28	Signal transduction: G-proteins	N4
30	Signal transduction: 2nd messengers I	N4
Feb. 4	Signal transduction: 2nd messengers II	N4
6	**Exam I:** Basic concepts in neuropharmacology	
11	Voltage-gated ion channels I	H4, 15; N2
13	Voltage-gated ion channels II	H5, 16; N2
18	Voltage-gated ion channels III	H13, 14; N2
20	Glutamate receptors I: AMPA/KA-Rs	N5; H10
25	Glutamate receptors II: NMDA-Rs (NRs)	N5; H10
27	Inhibitory amino acids I: Glycine-Rs, $GABA_A$-Rs, $GABA_C$-Rs	N5; H9
Mar. 4	Cholinegic receptors I: Nicotinic-Rs	N6, 9; H8
6	**Exam II:** Ionotropic neuropharmacology	
11,13	**SPRING BREAK**	No class meeting
18	Glutamate receptors III: mGluRs	N5; H12
20	Inhibitory amino acids II: $GABA_B$-Rs	N5; H11
25	Cholinegic receptors II: Muscarinic-Rs	N6, 9; H14
27	Biogenic amines I: catecholamines I: dopamine	N6, 16
Apr. 1	Biogenic amines II: catecholamines II: NE, EPI	N6
3	Biogenic amines III: indolamines	N6
8	Biogenic amines IV: histamine, orexin	N6
10	**Exam III:** Metabotropic neurotransmitters	
15	Steroids & peptide hormones	N7, 10
17	Anesthetics & alcohol	N5, 15
22	Opiates & anti-inflammatories	N7, 11, 15
24	Other drugs of abuse	N15
29	**FINAL EXAM REVIEW**	
May 1	**Final exam (Comprehensive)**	

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.