

NSC4352.001.14S CELLULAR NEUROSCIENCE — Fall 2016

MONDAY & WEDNESDAY 8:30 AM – 9:45 AM GR 4.428

Instructor Contact Information

Dr. Ted Price

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Office hours: Wed 10-11AM, or by appointment.

TA: Jordan Straight (e-mail: jls150230@utdallas.edu)

Review sessions: Fridays 3-4 PM in FN2.106

Undergrad TAs:

Course Description:

The purpose of the course is to impart to students a basic understanding of the field of cellular neuroscience, and provide them with the intellectual tools for understanding recent advances in the area of molecular and cellular events underlying neural signaling, synaptic transmission and plasticity. To this end the course will cover the molecular underpinnings of neuronal excitability, neuronal cell-to-cell communication and synaptic plasticity. An emphasis will be placed on molecular mechanisms that are thought to be drug targets and/or are involved in disease.

Prerequisites: NSC 3361.001 Introduction to Neuroscience

Student Learning Objectives:

After completing the course, students should be able to:

- Describe and analyze the contributions of anatomical, physiological, behavioral, pharmacological, and molecular biological studies to the bases of neuroscience,
- describe the basic morphology and functions of neurons and glia,
- use proper scientific terminology for neurotransmitters, neurotransmitter receptors, and neurotransmitter receptor/effector signaling systems,
- describe the cytology of subcellular organelles in neuronal cells,
- work with models describing electrical activity of neurons, particularly the role of ion channels in maintaining and altering neuronal membrane potential,
- describe mechanisms of synaptic transmission and synaptic plasticity induced by sensory experience and/or involved in pathology.

Required Textbook and Materials:

Required Resource: D. Purves et al., (eds) *Neuroscience*

5th edition (2012) ISBN 978-0-87893-695-3

<http://www.sinauer.com/catalog/neuroscience/neuroscience.html>

Recommended Resource: E.R. Kandel, J.H. Schwartz, and T.M. Jessell (eds) *Principles of Neural Science* (2012) ISBN-10: 9780071390118.

Elearning:

To comply with FERPA regulations, all email discussions to and from me MUST be through elearning. This is to protect your privacy. Grades will be posted as soon as they are available. Announcements will be made in class.

Exams and Assignments:

Exams: Students will be evaluated with 4 tests during the semester, and a comprehensive final exam. Tests will consist of multiple choice questions covering the preceding lessons. **These 5 tests will each count toward 20% of the final grade.**

Grading Policy: Grading will be done on a curve set for each individual exam. Grades will be assigned as A, B, C and so on using the + and - system. Final grades will be assigned based on an average of all exams. No extra test will be available for any reason. The only exceptions are given below.

Course and Instructor Policies

Attendance of classes is strongly recommended, as tests will be based on material taken from the classes and will not be restricted to the topics and textbooks indicated in this syllabus, which serves predominantly as a guideline to the course. The instructor will post lecture slides prior to class and will make every effort to also post lecture recordings following the class. Excused absences for exams will be given only if: (a) you are seriously ill and have verifiable documentation from a physician, or (b) you made prior arrangements to attend a verifiable religious or family event. In ALL of these cases you must notify the instructor in advance of the scheduled exam by email. Otherwise, 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 for a make-up exam, except for the final exam, which must be taken on the final exam date. Please DO NOT make early travel arrangements during Finals week!

DATE	TOPIC	ASSIGNMENTS
Mon Aug 22	Introduction (1)	Purves Ch. 1
Wed Aug 24	Structure of neurons (2)	Purves Ch. 1
Mon Aug 29	Glia and Neurons (3)	Purves Ch. 1
Wed Aug 31	Membrane Potential (4)	Purves Ch. 2
Mon Sept 5	No Class – Labor Day	
Wed Sept 7	Membrane Potential II (5)	Purves Ch. 2
Mon Sept 12	Action Potential (6)	Purves Ch. 2-3
Wed Sept 14	Action Potential II (7)	Purves Ch. 3
Mon Sept 19	Test 1	
Wed Sept 21	Ion Channels (8)	Purves Ch. 4
Mon Sept 26	No Class (Ted at IASP)	
Wed Sept 28	No Class (Ted at IASP)	
Mon Oct 3	Transporters (9)	Purves Ch. 4
Wed Oct 5	Tripartite Synapse (10)	Purves Ch. 5
Mon Oct 10	No Class (Ted at NIH)	
Wed Oct 12	Synaptic Transmission (11)	Purves Ch. 5
Mon Oct 17	Synaptic Transmission 2 (12)	Purves Ch. 5
Wed Oct 19	Test 2	
Mon Oct 24	Neurotransmitters and their receptors (13)	Purves Ch. 6
Wed Oct 26	Neurotransmitters and their receptors (14)	Purves Ch. 6
Mon Oct 31	Neurotransmitters and their receptors (15)	Purves Ch. 6
Wed Nov 2	Molecular Signaling within Neurons (16)	Purves Ch. 7
Mon Nov 7	Molecular Signaling within Neurons (17)	Purves Ch. 7
Wed Nov 9	Test 3 (Ted at U Iowa)	
Mon Nov 14	Synaptic Plasticity (short term; LTP) (18)	Purves Ch. 8
Wed Nov 16	Synaptic Plasticity (short term; LTP) (19)	Purves Ch. 8
Mon Nov 21	Fall Break	
Wed Nov 23	Fall Break	
Mon Nov 28	Synaptic Plasticity (LTP – LTD) (20)	Purves Ch. 8
Wed Nov 30	Pain and Plasticity (21)	Purves Ch. 10
Mon Dec 5	Genetics and Optogenetics (22)	
Wed Dec 7	Test 4	
Dec 11 -17	Finals week - FINAL comprehensive Exam	TBA

Schedule:

This schedule is *tentative*. There may be unforeseen outside factors (e.g. school closings due to inclement weather) that necessitate adjustments to this schedule, including the dates of reviews and tests. Any such adjustments will be announced in class and/or via e-learning. **All descriptions of the didactic material and the timelines are subject to change at the discretion of the instructor.** 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.