NSC 4352.001 CELLULAR NEUROSCIENCE — SPRING 2019

MONDAY AND WEDNESDAY 11:30 AM – 12:45 PM FN 2.102

Instructor Contact Information
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Course Description:

Purpose of the course is to supply the basic notions in the field of cellular neuroscience, and the intellectual tools for understanding recent advances of the molecular and cellular events underlying neural signaling, synaptic transmission and plasticity. To this end the basic morphology and functions of neurons and glia, describing cytology of subcellular organelles in neuronal cells, familiarizing the students with electric neuronal models, and illustrating as examples the neuromuscular junction, central synapses, synaptic integration and plasticity.

Prerequisites: None

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 experience,
- describe and analyze neurophysiological recording methods used to assess neuronal activity, and limits of these techniques.

Required Textbook and Materials:

Required: D. Purves et al., (eds) *Neuroscience* 6th edition (2017) ISBN-10: 1605353809. The 5th edition is acceptable as well.

Also **recommended**:
E.R. Kandel, J.H. Schwartz, and T.M. Jessell (eds) *Principles of Neural Science* 5th ed. (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 and short answer questions covering the preceding lessons. **Each Test will count 30 points toward the final grade and the Final Exam counts 60 points, for a total of 180 points** (see below)**.**

Grading Policy: Grading is based on a set of a priori criteria: 90% (or 162+ points) correct for A (A- = 162-169 pts.; A = 170-174 pts.; A+ = >175 pts.), ~80% (or 144+ points) for B (B- = 144-149 pts.; B = 150-155 pts.; B+ = 156-161 pts.), ~70% (or 127+ points) for C (C- = 126-131 pts.; C = 132-137 pts.; C+ = 138-143 pts.), and ~60% (or 108+ points) for D (D- = 108-113 pts.; D = 114-119 pts.; D+ = 120-125 pts.), less than ~60% (108 points) is automatically an F

Sometimes e-learning calculates percentages differently than the brackets/ranges listed here. In these rare cases the grade is based on the points and grades listed above!

Tests will not be curved. However, the instructor reserves the right to change the evaluation criteria (grade brackets) at his discretion, even from test to test. No extra test or "extra credit" will be available for any reason; however, there will be bonus points available throughout most (all) tests.

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. Finally, the instructor reserves the right to adjust the final grade based on the student's participation in the class-room.

Excused absences for exams will be given only if: (a) you are seriously ill and have verifiable documentation from a physician, or (b) you were detained by law at the exam time, or (c) you made prior arrangements to attend a verifiable religious or family event. In ALL of these cases except (b), you must notify the instructor in advance of the scheduled exam by email; for (b), your court order will suffice. 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, except for the final exam, which must be taken on the final exam date. Please DO NOT make early travel arrangements during Finals week!

I do not own copyright to the graphics used in lectures, so I cannot post PowerPoints for your use (please do not ask). You remember information better if you write it down yourself, rather than passively view it, so please take good notes in class!

DATE	Lecture	TOPIC	ASSIGNMENTS
Mon Jan. 14	1	Introduction	Purves Ch. 1; Kandel Ch. 1
Wed Jan. 16	2	Structure of neurons	Kandel Ch. 2, 4
Mon Jan. 21		**No Class - Martin Luther King Day**	
Wed Jan. 23	3	Glia and Neurons	Purves Ch. 1; Kandel Ch. 2
Mon Jan. 28	4	Membrane Potential	Purves Ch. 2; Kandel Ch. 6
Wed Jan. 30	5	Action potential	Purves Ch. 3; Kandel Ch. 7
Mon Feb. 4	6	Action potential	Purves Ch. 3; Kandel Ch. 7
Wed Feb. 6		Review	
Mon Feb. 11		**Test 1**	
Wed Feb. 13	7	Passive membrane properties	Purves Ch. 2; Kandel Ch. 8
Mon Feb. 18	8	Ion channels and transporters	Purves Ch. 4; Kandel Ch. 5
Wed Feb. 20	9	Synaptic transmission	Purves Ch. 5; Kandel Ch.8, 9
Mon Feb. 25	10	Synaptic transmission	Purves Ch. 5; Kandel Ch.10, 12
Wed Feb. 27		Review	
Mon Mar. 4		**Test 2**	
Wed Feb. 6	11	Neurotransmitters and their receptors I	Purves Ch. 6; Kandel Ch. 13
Mon Mar. 11	12	Neurotransmitters and their receptors II	Purves Ch. 6; Kandel Ch. 13
Wed Mar. 13	13	Neurotransmitters and their receptors III	Purves Ch. 6; Kandel Ch. 13
Mar. 18 -24		**No Class – Spring Break**	
Mon Mar. 25	14	Molecular Signaling within Neurons	Purves Ch. 6; Kandel Ch. 11
Wed Mar. 27	15	Molecular Signaling within Neurons	Purves Ch. 7; Kandel Ch. 11
Mon Apr. 1	16	Molecular Signaling within Neurons	Purves Ch. 7; Kandel Ch. 11
Wed Apr. 3		Review	
Mon Apr. 8		**Test 3**	
Wed Apr. 10	17	Synaptic Plasticity (short term; facilitation/depression)	Purves Ch. 8; Kandel Ch. 66, 67
Mon Apr. 15	18	synaptic plasticity (LTP – LTD)	Purves Ch. 8; Kandel Ch. 66, 67
Wed Apr. 17	19	synaptic plasticity (LTP – LTD)	Purves Ch. 8; Kandel Ch. 66, 67
Mon Apr. 22	20	Spike timing-dependent plasticity / Activity in neuronal networks	Purves Ch. 8
Wed Apr. 24	21	Activity in neuronal networks	Purves Ch. 1, Kandel Ch. 50
Mon Apr. 29		Review	
Wed May 1		**Test 4**	Purves 27; Kandel 60
May. 6 - 11		**Finals week - FINAL comprehensive Exam**	

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.