

# ACN/HCS 6340.501 CELLULAR NEUROSCIENCE — SUMMER 2021

MONDAY & WEDNESDAY 10:00 AM – 11:15 PM ONLINE

## Instructor Contact Information

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**Office hours:** Tuesdays at 9 am via the MS Teams channel (below). In addition, send me emails with specific questions about the lectures or other concerns (tests, student life in general, etc.), or to schedule a virtual meeting via MS Teams.

## **Instructional Mode: Online via the MS Teams group(s) ACN/HCS 6340.501 CELLULAR NEUROSCIENCE**

A link for the merged course (ACN and HCS sections) is posted on the course's **e-learning homepage** and right below here. Send me an email ASAP if the link does not work or you have other problems accessing the course materials)

This link should open the merged MS Teams page....

<https://teams.microsoft.com/l/meetup-join/19%3a3SUN424zIQ3hFr-c2rdN7Vs4zChkaY5G3KhEU-nWSis1%40thread.tacv2/1621521373808?context=%7b%22Tid%22%3a%228d281d1d-9c4d-4bf7-b16e-032d15de9f6c%22%2c%22Oid%22%3a%22873c26c8-2c98-47e3-bd8a-c1b1390b88a1%22%7d>

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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 5<sup>th</sup> edition is acceptable as well.

Also **recommended:** G.L. Fain *Molecular and Cellular Physiology of Neurons, 2nd Edition* (2014) ISBN-10: 0674599217

E.R. Kandel, J.H. Schwartz, and T.M. Jessell (eds) *Principles of Neural Science* 5th ed. (2012) ISBN-10: 9780071390118.

You do NOT **NEED** the latter books... All chapters from Kandel listed in the "assignments" section are redundant and/or will be covered by my course materials/slides.

Textbooks and some other bookstore materials can be ordered online or purchased at the [UT Dallas Bookstore](#).

## **Technical Requirements:**

In addition to a confident level of computer and Internet literacy, certain minimum technical requirements must be met to enable a successful learning experience. Please review the important technical requirements on the [Getting Started with eLearning](#) webpage.

### **Course Access and Navigation:**

This course can be accessed using your UT Dallas NetID account on the [eLearning](#) website. Please see the course access and navigation section of the [Getting Started with eLearning](#) webpage for more information. To become familiar with the eLearning tool, please see the [Student eLearning Tutorials](#) webpage. UT Dallas provides eLearning technical support 24 hours a day, 7 days a week. The [eLearning Support Center](#) includes a toll-free telephone number for immediate assistance (1-866-588-3192), email request service, and an online chat service.

**Lectures: All lectures will be posted as videos on MS Stream.** The corresponding **pdfs** of lecture slides will be posted on **eLearning** in clearly labeled folders.

How to access stream videos (student instructions):

<https://dox.utdallas.edu/instruction1159>

Videos take a while to be uploaded and to be close-captioned.

### **Communication:**

This course utilizes online tools for interaction and communication. Some external communication tools such as regular email and a web conferencing tool (MS Teams) will also be used during the semester. For more details, please visit the [Student eLearning Tutorials](#) webpage for video demonstrations on eLearning tools.

To comply with FERPA regulations, all email discussions to and from me MUST be through e-learning. This is to protect your privacy. Discussion boards and Chat are available for your use. I will not routinely monitor them unless I receive complaints about inappropriate posting. Grades will be posted as soon as they are available. Announcements will be made from time to time via email and in class.

Note: This lecture and test format obviously requires a good connection to the internet. Charter Communications is offering free broadband and Wi-Fi access for 60 days to households with K-12 or college students who do not already have a broadband subscription. Students can call 1-844-488-8395 to enroll. UTD is extending its WiFi service so that you can get adequate service anywhere on campus (e.g. in your car in a parking lot).

### **Server Unavailability or Other Technical Difficulties:**

The online lecture and test format require a good connection to the internet. UTD is extending its WiFi service so that you can get adequate service anywhere on campus (e.g. in your car in a parking lot).

The University is committed to providing a reliable learning management system to all users. However, in the event of any unexpected server outage or any unusual technical difficulty which prevents students from completing a time sensitive assessment activity, the instructor will provide an appropriate

accommodation based on the situation. Students should **immediately (!!!)** report any problems to the instructor and also contact the online [eLearning Help Desk](#) or UTD's general Office of Information Technology helpdesk <https://oit.utdallas.edu/>. The instructor and these help desks will work with the student to resolve any issues at the earliest possible time.

### **E-learning:**

To comply with FERPA regulations, all email discussions to and from me MUST be through e-learning. This is to protect your privacy. Discussion boards and Chat are available for your use. I will not routinely monitor them unless I receive complaints about inappropriate posting. Grades will be posted as soon as they are available. Announcements will be made from time to time via email and in class.

### **Exams and Assignments:**

**Exams: Students will be evaluated with 3 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 40 points toward the final grade, the Final Exam counts 60 points for a total of 180 points** (see below).

All tests will be taken online via elearning. **The tests will be scheduled for the class times;** however, if you have important (and verifiable) reasons why you would prefer a different test time, please let me know ASAP (at least 1 day before the test).

I will try to send out links and reminders for the tests at least 1-2 days before the date of the test; however, remembering the test dates is your responsibility.

**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.

### 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.

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 important family event, or represent UTD in a university-sanctioned event. In ALL of these cases except (b), you must notify the instructor **in advance** of the scheduled exam by email and you need to provide documentation; 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! (The fact that "tickets are cheaper" is not a good enough reason to request a makeup exam...)

### Class Recordings:

Students are expected to follow appropriate University policies and maintain the security of passwords used to access recorded lectures. Unless the Office of Student AccessAbility has approved the student to record the instruction, students are expressly prohibited from recording any part of this course. Recordings may not be published, reproduced, or shared with those not in the class, or uploaded to other online environments except to implement an approved Office of Student AccessAbility accommodation. Failure to comply with these University requirements is a violation of the [Student Code of Conduct](#).

The instructor may record meetings of this course. Any recordings will be available to all students registered for this class as they are intended to supplement the classroom experience. Students are expected to follow appropriate University policies and maintain the security of passwords used to access recorded lectures. **Unless the Office of Student AccessAbility has approved the student to record the instruction, students are expressly prohibited from recording any part of this course.** Recordings may not be published, reproduced, or shared with those not in the class, or uploaded to other online environments except to implement an approved Office of Student AccessAbility accommodation. If the instructor or a UTD school/department/office plans any other uses for the recordings, consent of the students identifiable in the recordings is required prior to such use unless an exception is allowed by law. Failure to comply with these University requirements is a violation of the [Student Code of Conduct](#).

### Class Materials:

The Instructor may provide class materials that will be made available to all students registered for this class as they are intended to supplement the classroom experience. These materials may be downloaded during the course; however, these materials are for registered students' use only. Classroom materials may not be reproduced or shared with those not in class, or uploaded to other online environments except to implement an approved Office of Student AccessAbility accommodation. Failure to comply with these University requirements is a violation of the [Student Code of Conduct](#).

DATE	Lecture	TOPIC	Book chapters on which the lectures are based
Mon May 24	1	Introduction	Purves Ch. 1; Kandel Ch. 1
Wed May 26	2	Structure of neurons	Kandel Ch. 2, 4
Mon May 31		<b>Memorial Day</b>	
Wed June 2	3	Glia and Neurons	
Mon June 7	4	Membrane Potential	Purves Ch. 2; Kandel Ch. 6
Wed June 9	5	Action potential	Purves Ch. 3; Kandel Ch. 7
Mon June 14	6	Action potential	Purves Ch. 3; Kandel Ch. 7
Wed June 16	7	Passive membrane properties	Purves Ch. 2; Kandel Ch. 8
Mon June 21		<b>Test 1</b>	
Wed June 23	8	Ion channels and transporters	Purves Ch. 4; Kandel Ch. 5
Mon June 28	9	Ion channels and transporters	Purves Ch. 5; Kandel Ch.8, 9
Wed June 30	10	Synaptic transmission	Purves Ch. 5; Kandel Ch.8, 9
Mon July 5	11	Synaptic transmission	Purves Ch. 5; Kandel Ch.10, 12
Wed July 7		<b>Test 2</b>	Purves Ch. 6; Kandel Ch. 13
Mon July 12	12	Neurotransmitters and their receptors	
Wed July 14	13	Neurotransmitters and their receptors	Purves Ch. 6; Kandel Ch. 13
Mon July 19	14	Molecular Signaling within Neurons	Purves Ch. 7; Kandel Ch. 11
Wed July 21	15	Molecular Signaling within Neurons	Purves Ch. 7; Kandel Ch. 11
Mon July 26	16	synaptic plasticity (LTP – LTD)	Purves Ch. 8; Kandel Ch. 66, 67
Wed July 28	17	synaptic plasticity (LTP – LTD) - STDP	Purves Ch. 8; Kandel Ch. 66, 67
Mon Aug 2		<b>Test 3</b>	
Wed Aug 4		<b>FINAL comprehensive Exam</b>	

**Schedule:**

**This schedule is tentative.** There may be unforeseen outside factors (e.g. illness) 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 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.