NSC 4352.002—Cellular Neuroscience—Spring 2023

Mon & Wed 8:30-9:45 AM, SCI 2.230

Professor	**Dr. Amy Zwierzchowski-Zarate** JO 4.314	amy.zwierzchowski@utdallas.edu Office hours: Mon 10:30 – 12:00 PM (other times by email arrangement only)

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Prerequisite: None.

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.

Learning Objectives: After taking this 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.

Recommended Text:
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) ISBN10: 9780071390118.

You do NOT NEED the latter book… 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.

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.

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.

Course & Instructor Policies. Class format is in person, unless you are seriously ill (see below). In case of illness, class may be streamed live on Teams, but recordings will not be made. Discussions begin promptly, so lateness is rude to all.

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/quizzes** will be 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 academic conference, or a religious or family event. In all cases except (b) **you must notify the instructor >4 hours IN ADVANCE of the scheduled exam by email**. Otherwise, you will receive a zero (0) for that exam. A single makeup exam will be scheduled within 5 days of the original exam date.

•Grades will be posted on eLearning, and exams reviewed in a timely fashion to give you feedback to study for your next exam.

•Classroom Community - You should feel free to ask questions and express ideas about the subject matter.

•**PHOTOGRAPHY/VIDEOGRAPHY STRICTLY PROHIBITED IN CLASS**

Class Schedule

(Subject to change at the discretion of the instructor)

Date	Lecture	Topic	Book Chapter	Quiz/Assignment DUE
Mon Jan. 16		*NO CLASS – MLK DAY*		
Wed Jan. 18	1	Introduction	1	
Mon Jan. 23	2	Structure of neurons	-	
Wed Jan. 25	3	Glia and Neurons	-	H1
Mon Jan. 30	4	Membrane Potential	2	Q1
Wed Feb. 1	5	Action potential I	3	H2
Mon Feb. 6	6	Action potential II	3	Q2
Wed Feb. 8	7	Action potential III	3	H3
Mon Feb. 13	8	Passive membrane properties	2	Q3
Wed Feb. 15	9	Ion channels and transporters I	4	H4
Mon Feb. 20	**Review Session**			Q4
Wed Feb. 22	10	Ion channels and transporters II	4	H5
Mon Feb. 27	11	Ion channels and transporters III	4	Q5
Wed Mar. 1	12	Synaptic transmission I	5	
Mon Mar. 6	**Review Session**			
Wed Mar. 8	**EXAM I: Lectures 1-12**			Exam 1
Mon Mar. 13	*NO CLASS – SPRING BREAK*			
Wed Mar. 15	*NO CLASS – SPRING BREAK*			
Mon Mar. 20	13	Synaptic transmission II	5	
Wed Mar. 22	14	Synaptic transmission III	5	H6
Mon Mar. 27	15	Neurotransmitters and their receptors I	6	Q6
Wed Mar. 29	16	Neurotransmitters and their receptors II	6	H7
Mon Apr. 3	17	Neurotransmitters and their receptors II	6	Q7
Wed Apr. 5	18	Molecular signaling in neurons I	7	H8
Mon Apr. 10	**Review Session**			Q8
Wed Apr. 12	19	Molecular signaling in neurons II	7	H9
Mon Apr. 17	20	Synaptic plasticity (short term; facilitation/depression) I	8	Q9
Wed Apr. 19	21	Synaptic plasticity (LTP-LTD) II	8	H10
Mon Apr. 24	22	Synaptic plasticity (LTP-LTD) III	8	Q10
Wed Apr. 26	23	Synaptic plasticity – spike timing-dependent plasticity/Activity in neuronal networks	8	P1
Mon May 1	**Review Session**			
Wed May 3	**EXAM II: Comprehensive**			Exam 2
Wed May 10	*Finals Week – No Final will be given for this course*			Late homework (see "Hall Pass")

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.

Assignments

HOMEWORK

- 10 homework assignments designed to prepare you for class, quizzes, exams as well as thinking critically and connecting material beyond the classroom. Homework is due by end of day (11:59pm CST on date DUE on syllabus, see "class schedule").
  - **Hall Passes** – at the beginning of the semester you get 3 Hall Passes. You can use these to turn in homework late with no penalty.
    - **In order to use a Hall Pass you must** email the instructor by **Monday, May 1st 11:59pm CST or before**, include the number of the homework assignment and the wording "I wish to use one of my Hall Passes on homework # __." **Once a Hall Pass is used, it cannot be revoked**. Hall passes will NOT be accepted after 5/1/2023 11:59pm CST.
    - All late homework under a Hall Pass is due no later than Tues, May 9th by end of day 11:59pm CST.

QUIZZES

- 10 weekly, comprehensive quizzes designed to check your understanding of material and get feedback before taking large exams. **Quizzes will be taken at the START of class on Mondays. Quizzes are in-person and via eLearning. Be prepared.**
  - There will be NO makeup quizzes UNLESS (a) you are seriously ill and have verifiable documentation from a physician, or (b) you were legally detained at the quiz time or (c) you made **prior**, **approved**, arrangements to attend a verifiable academic conference, or a religious or family event. In all cases except (b) you must notify the instructor **>4 hours IN ADVANCE of the scheduled quiz by email.** Otherwise, you will receive a zero (0) for that quiz. A single makeup quiz will be scheduled within 5 days of the original exam date.
  - Hall Pass – If at the end of the semester you have a Hall Pass left, **you may use 1 Hall Pass** to drop your lowest quiz grade (instead of using it for no penalty late homework).

EXAMS

- 2 comprehensive quizzes will be given. **Exams will be in-person via eLearning.** Material for exams is largely taken from class lectures/discussion, so attendance for all class sessions is strongly encouraged. Format of exam questions is designed to be challenging and to encourage integrative thought about the material; matching, fill-in-the-blank, short answer, and multiple-choice questions may be used, along with short answer questions requiring a full conceptual understanding and an ability to apply these concepts in hypothetical situations. Knowledge of a select group of generic drug names, and the relevant receptors they bind to, is required, as is conceptual and theoretical knowledge of the cell biological and organismal physiology affected.
  - There will be NO makeup exams UNLESS (a) you are seriously ill and have verifiable documentation from a physician, or (b) you were legally detained at the quiz time or (c) you made **prior, approved** arrangements to attend a verifiable academic conference, or a religious or family event. In all cases except (b) you must notify the instructor **>4 hours IN ADVANCE of the scheduled exam by email.** Otherwise, you will receive a zero (0) for that exam. A single makeup exam will be scheduled within 5 days of the original exam date.

PROJECT (INDIVIDUAL OR GROUP)

- One (1) project will be completed. **See Project handout for full details.**
  - Projects are ways to demonstrate understanding of material above and beyond exam questions. You will investigate an instructor approved neuropharmacological topic of your choice that ties what we have discussed in class and how it relates to human issues (disease, ethics, politics). **Cite any sources you use.**
  - You may work independently OR in a group of up to 4 people.
  - **Group projects -** If you work in a group, include ALL group member names on your submission as well as a list of contributions by individual. Group projects must constitute a significant final product above and beyond what an individual contribution would entail. See rubric on Project handout.

Grading Policy

The plus/minus grading system is used in this course. A+ (97–100), A (94-96.9), A- (90-93.9), B+ (87-89.9), B (84-86.9), B- (80-83.9), C+ (77-79.9), C (74-76.9), C- (70-73.9), D+ (67-69.9), D (64-66.9), D- (60-63.9), F (<60)

Grades will not be rounded up and no extra credit will be given to individuals. Please do not ask.

At the end of the semester, I calculate your grade using all 3 grading schemes → **YOU GET THE BEST GRADE!**

Multiple Grading Schemes			
	A	**B**	**C**
Exams (2)	35%	50%	70%
Quizzes** (10)	35%	20%	0%
Homework** (10)	20%	20%	20%
Project (1)	10%	10%	10%
TOTAL	**100%**	**100%**	**100%**

You start the semester with 3 hall passes that you can use to turn homework in late with no penalty. If you don't use them all, you **may use 1 hall pass to instead drop your lowest quiz grade.

OTHER IMPORTANT INFORMATION

Academic Integrity
Academic Dishonesty including but not limited to cheating on exams and sharing or posting exam questions (with or without the correct answers) will not be condoned in my class or at UTD. Any action deemed as potential academic dishonesty will be reported to the Office of Community Standards and Conduct for official review.

Communication
This course utilizes online tools for interaction and communication. Some external communication tools such as regular email may also be used during the semester. Student emails and discussion board messages will be answered within 3 working days under normal circumstances.

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.

Academic Support Resources
The information contained in the following link lists the University's academic support resources for all students.
Please go to Academic Support Resources webpage for these policies.

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.

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Student AccessAbility (OSA): It is the policy and practice of The University of Texas at Dallas to make reasonable accommodations for students with properly documented disabilities. However, written notification from the Office of Student AccessAbility (OSA) is required. If you are eligible to receive an accommodation and would like to request it for this course, please discuss it with me and allow *at least* **one week** advance notice. I want to help every student success, but have to have time to prepare to help you. Students who have questions about receiving accommodations, or those who have, or think they may have, a disability (mobility, sensory, health, psychological, learning, etc.) are invited to contact OSA: in person at the Student Services Building 3.200, by phone 972-883-2098, or by email at studentaccess@utdallas.edu.

Server Unavailability or Other Technical Difficulties
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. The instructor and the eLearning Help Desk will work with the student to resolve any issues at the earliest possible time.

Comet Creed
This creed was voted on by the UT Dallas student body in 2014. It is a standard that Comets choose to live by and encourage others to do the same:

"As a Comet, I pledge honesty, integrity, and service in all that I do."

UT Dallas Syllabus Policies and Procedures
The information contained in the following link constitutes the University's policies and procedures segment of the course syllabus. Please review the catalog sections regarding the credit/no credit or pass/fail grading option and withdrawal from class.

Please go to UT Dallas Syllabus Policies webpage for these policies.

The descriptions and timelines contained in this syllabus are subject to change at the discretion of the Professor.