

INTD 5040
FUNDAMENTALS OF NEUROSCIENCE I
MOLECULAR, CELLULAR, & DEVELOPMENTAL NEUROSCIENCE
SPRING 2019

CLASS DAYS and TIME: Tuesdays/Thursdays 8:00-10:00 a.m.

CLASSROOM: Long Campus, Basic Science Building 3.078V (Physiology Large Conference Room)

COURSE DIRECTORS: Drs. Eileen Lafer and Jason Pugh

COURSE ADMINISTRATOR: Heather Hunter (hunterh@uthscsa.edu), X74220

OFFICE LOCATION and HOURS: MED 415B (Lafer), STRF 236.3 (Pugh)

EMAIL: lafer@uthscsa.edu, pughj@uthscsa.edu

TELEPHONE: x73764 (Lafer), x24040 (Pugh)

READ THIS DOCUMENT CAREFULLY - YOU ARE RESPONSIBLE FOR ITS CONTENTS.

COURSE DESCRIPTION AND OBJECTIVES

This course is intended to introduce students to a broad survey of the basics of molecular, cellular and developmental neuroscience. The course is organized into a series of two modules: Cellular and Molecular Neuroscience, and Signalling and Developmental Neuroscience, which covers the fundamentals of these two areas. Current topics and concepts are discussed in discussion sessions that include student participation. Two components; Neuroscience students register for both PHYL 5041 and INTD 5040.

Pre-requisites – PHYL 5041 (Excitable Membranes) is a co-requisite, and the course is designed to transition from PHYL 5041 to INTD 5040 in the same time slot. The PHYL 5041 co-requisite is **required for Neuroscience students**, but other students may take INTD 5040 without PHYL 5041 with permission from a course director (Dr. Lafer or Pugh). While there is no specific pre-requisite, some prior neuroscience knowledge is required to comprehend this material. Please obtain the permission from Dr. Lafer or Dr. Pugh in advance of registering for this course.

Semester credit hours – 2 credit hours

By the end of this course, each student should be able to:

- Describe in detail the fundamental molecular, cellular, and developmental factors that collectively determine neuronal and circuit function in the brain.
- Formulate realistic, hypothesis-based experiments to address scientific questions concerning molecular, cellular, and developmental neuroscience.
- Evaluate and assess scientific literature related to molecular, cellular, and developmental neuroscience.

COURSE ORGANIZATION

The main teaching modalities used in this course include:

- 1) Textbook readings and didactic lectures will be used to introduce factual material
- 2) Paper discussions will be used to help the students integrate knowledge with relevant literature

Materials – **Textbook Reading Assignments** are listed on the class schedule. Please read the assigned material before

attending the lecture. **Slides** for each lecture will be available through CANVAS up to three days prior to lectures. Hard copies will not be provided. **Papers for discussion** will be available through CANVAS up to one week prior to its discussion.

Computer Access – CANVAS access is required for course materials and the exams. Print copies of slides and other materials will not be provided to the students.

Reading Assignments – Please refer to the class schedule for readings.

ATTENDANCE

Students are required to attend every lecture and paper discussion. If you are ill and unable to attend a class period, you **MUST** contact, in advance and by email, one of the course directors (lafer@uthscsa.edu, pughj@uthscsa.edu) to be excused.

TEXTBOOKS

Recommended: The major textbook for the course is Squire et al. 4th edition (i). Readings in Byrne & Roberts 2nd edition (ii) and Byrne et al. 3rd edition (iii) are required for selected lectures. We suggest that you purchase Squire (available to buy or rent from amazon), which will also be used in Fundamentals of Neuroscience II, although copies are on reserve in Briscoe library. Byrne and Roberts is also on reserve in the library, and we will provide you with selected scanned chapters of both Byrne et al. texts on CANVAS. Readings from the scientific literature will be assigned and distributed through CANVAS.

i) Fundamental Neuroscience; 4th edition, Eds. Squire et al.; Academic Press, 2012,

<http://www.amazon.com/Fundamental-Neuroscience-Fourth-Edition-Squire/dp/0123858704>

ii) From Molecules to Networks: An Introduction to Cellular and Molecular Neuroscience; 2nd edition, Eds. Byrne J & Roberts J; Academic Press, 2009. http://www.amazon.com/Molecules-Networks-Second-Introduction-Neuroscience/dp/0123741327/ref=sr_1_10?s=books&ie=UTF8&qid=1359428204&sr=1-10&keywords=roberts+neuroscience

iii) From Molecules to Networks: An Introduction to Cellular and Molecular Neuroscience; 3rd edition, Eds. Byrne et al.; Academic Press, 2014. http://www.amazon.com/From-Molecules-Networks-Third-Edition/dp/0123971799/ref=pd_cp_b_0

GRADING POLICIES AND EXAMINATION PROCEDURES

Your final grade will be based on the arithmetic average of two take home exams. These exams will be distributed through CANVAS and must be returned through CANVAS. You will be given seven days to return the exam. As there are only two exams there are no make-ups, and if an exam is turned in late it will be subject to a 10% penalty for each day that it is late. Students may petition the course directors to extend the deadline without penalty, but waivers are only granted due to extraordinary circumstances such as documented illness.

Grading System

The final grading scale will be at least as generous as the one listed below. In some past years the final distribution of grades has been used as justification to curve grades to the students' benefit up to 5%.

A = 90-100% B = 80-89% C = 70-79% F = < 69%

REQUESTS FOR ACCOMODATIONS FOR DISABILITIES

In accordance with policy 4.2.3, **Request for Accommodation Under the ADA and the ADA Amendments Act of 2008 (ADAAA)**, any student requesting accommodation must submit the appropriate request for accommodation under the American with Disabilities Act (ADA, form 100). to his/her appropriate Associate Dean of their School and a copy to the ADA Coordinator. Additional information may be obtained at <http://uthscsa.edu/eeo/request.asp>.

ACADEMIC INTEGRITY AND PROFESSIONALISM

Any student who commits an act of academic dishonesty is subject to discipline as prescribed by the UT System Rules and Regulations of the Board of Regents. Academic dishonesty includes, but is not limited to, cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an exam for another person, signing attendance sheets for another student, and any act designed to give unfair advantage to a student or the attempt to commit such an act. Additional information may be obtained at <http://catalog.uthscsa.edu/generalinformation/generalacademicpolicies/academicdishonestypolicy/>

TITLE IX AT UTHSCSA

Title IX Defined:

Title of the Education Amendments of 1972 is a federal law that prohibits sex discrimination in education. It reads “no person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving Federal financial assistance.”

University of Texas Health Science Center San Antonio’s Commitment:

University of Texas Health Science Center San Antonio (UTHSCSA) is committed to maintaining a learning environment that is free from discriminatory conduct based on gender. As required by Title IX, UTHSCSA does not discriminate on the basis of sex in its education programs and activities, and it encourages any student, faculty, or staff member who thinks that he or she has been subjected to sex discrimination, sexual harassment (including sexual violence) or sexual misconduct to immediately report the incident to the Title IX Director.

In an emergency, victims of sexual abuse should call 911. For non-emergencies, they may contact UPD at 210-567-2800. Additional information may be obtained at <http://students.uthscsa.edu/titleix/>

EMAIL POLICY

As graduate students your goal should be to learn the material in depth and not simply well enough to pass the exams. If you are struggling with any aspect of this class or have any questions please do not hesitate to contact the directors or individual faculty members in person, by phone or over email. Due to conferences, out of town seminars, and grant deadlines please understand that email replies may not be immediate. During the exam period please direct inquiries to the course directors and administrator and do not contact individual faculty.

USE OF RECORDING DEVICES

Lectures may only be recorded with the permission of each individual instructor, **obtained in advance**. Please do not show up to class and ask if you can record that day’s lecture.

ELECTRONIC DEVICES

Cell phones should be turned off or put away during class. Computers and tablets may be used to follow along with slides, take notes, look up the occasional unfamiliar term, and perform other activities directly related to the course material.

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WEEK	DATE	TITLE	Hrs	Assignment	Topic	Instructor
Module I: Cellular and Molecular Neuroscience						
Week 1	Feb 19	C1	2		Neuronal and glial cytology, Cajal's early work, multiple structures fit for different function, cell types. Neurovasculature: endothelial cells, blood brain barrier; Paper discussion	Roberts
	Feb 21	C2	1		Energy Metabolism: glycolysis and ox. phos., blood flow, glial involvement, glycogen storage	Lechleiter
Week 2	Feb 26	C3	2		The Synaptic Vesicle Cycle I	Lafer
	Feb 28	C3	2		The Synaptic Vesicle Cycle II Paper discussion	Lafer
Week 3	Mar 5	C4	2		Oxidative stress: causes, targets, and enzymatic repair after damage. Paper discussion	Ran
	Mar 7	C5	2		Axonal Transport: mechanisms, fast vs slow, retrograde vs anterograde. Paper discussion	Kim
Week 4	Mar 12				No Class (spring break)	
	Mar 14				No Class	
Week 5	Mar 19	C6	2		Neurotransmission I: Glu, Ach, GABA, Glycine Paper Discussion	Paukert
	Mar 21	C7	2		Neurotransmission II: biogenic amines: catecholamines and serotonin Paper discussion	Paukert
Week 6	Mar 26	C7	1		Exam will be distributed via Canvas on March 28 at 12:00 pm, and will be due by 12:00 pm on April 5	Paukert
	Mar 28				No Class (exam period)	
Module II: Signaling and Developmental Neuroscience						
Week 7	Apr 2	S1	2		Brain injury and repair. Paper discussion	Lechleiter
	Apr 4				No Class	
Week 8	Apr 9	S2	2		No Class (Experimental Biology conference)	

	Apr 11				Metabotropic Receptors: G-proteins, recycling, effector proteins, second messengers.	Clarke
Week 9	Apr 16	S2	1		Paper discussion	Clarke
	Apr 18	S3	2		Synaptic Function: Presynaptic Excitability. Paper discussion	Kim
Week 10	Apr 23	S4	2		Synaptic Plasticity: Facilitation, Augmentation, PTP. Paper discussion	Pugh
	Apr 25	S5	2		Synaptic Plasticity: LTP and LTD. Paper discussion	Pugh
Week 11	Apr 30	S6	2		Cell-Cell Interactions: Gap Junctions. Paper discussion	Nicholson
	May 2	S7	2		Cell Fate and Neuronal Differentiation. Conserved Mechanisms of Cell Migration and Growth Cone Navigation I.	Sia
Week 12	May 7	S8	2		Conserved Mechanisms of Cell Migration and Growth Cone Navigation II. Paper discussion	Sia
	May 9	S9	2		Topographic Maps and Developmental Remodeling: Chemoaffinity Versus Experience. Paper discussion Exam will be distributed via Canvas on May 10 at 12:00 pm, and will be due by 12:00 pm on May 17	Sia
Week 13	May 14				No Class (Exam period)	
	May 16					
Week 14	May 21					
	May 23					