

PRINCIPLES OF NEUROSCIENCE II: CELLULAR AND MOLECULAR NEUROSCIENCE

GMS6022 -- SPRING/2018

2 CREDITS

CLASS LOCATION: MBI BUILDING, L1-101

MEETING TIME: MONDAY, WEDNESDAY (9-11:00 AM), FRIDAY (9-10 AM)

COURSE DIRECTORS: *Tom Foster, Ph.D.*

foster1@ufl.edu

352-273-0093

Dr. Sara Burke

burkes@ufl.edu

352-294-4979

COURSE DESCRIPTION AND OBJECTIVES:

This five-week course provides for integration of molecular and cellular techniques into learning about the fundamental principles of electrical properties and synaptic signaling in excitable cells. Students will gain an understanding of the physiological properties of the components of the nervous system, how ions and ion channels govern the membrane potential and excitability, and how signaling properties arise at the single neuron level to manifest as larger networks that support behavior. Following the function of individual cells, the manner in which they are connected will be covered, including synaptic signaling between neurons. We will cover the molecular make-up of synapses, and different kinds of synapses, the quantal theory of transmission, and neuromodulation. We will also discuss the different kinds of synaptic plasticity mechanisms that make synaptic strength use-dependent. The course includes a review of model systems and neural circuits in integrative neurophysiology, as well as the relation of neural circuits to behavior and cognitive processes.

COURSE TEXTBOOK:

From Neuron to Brain, Fifth Edition by John G. Nicholls(Author), A. Robert Martin(Author), Paul A. Fuchs as well as readings assigned by lecturers

PREREQUISITE KNOWLEDGE AND SKILLS:

You are expected to be familiar with basic Neuroscience concepts before starting this course series. If you are uncertain about the sufficiency of your background, you are encouraged to read through chapters 1-7 in Neuroscience Online – an electronic textbook (Open Access)

<http://neuroscience.uth.tmc.edu/index.htm>

COURSE SCHEDULE:

Day	Date	Topic	Reading	Lecturer
1	March 26	The Fundamentals of Electrophysiology I: Introduction to Ionic Currents and Channels Structure of Ion Channels	Ch 4-6	Dr. Tom Foster
2	March 28	The Fundamentals of Electrophysiology II: The Resting Membrane Potential The Action Potential	Ch 6-8	Dr. Tom Foster
3	March 30	Electrophysiology of Synaptic transmission, Quantal Analysis	Ch 13	Dr. Tom Foster
4	April 2	Problem sets and review of Electrophysiology Principles		Dr. Tom Foster
5	April 4	Neurobiology of Glia Neuroimmunology	Ch 10	Dr. Jake Streit
6	April 6	EXAM I		
7	April 9	Synaptic Plasticity The Hippocampus and NMDA receptor dependent LTP and LTD	Ch 16	Dr. Sara Burke
8	April 11	Chemosensory Signal Transduction Sensory transduction and Elementary Neuronal Networks I	<i>TBD</i> Ch 19	Dr. Jeremy McIntrye Dr. Sara Burke
9	April 13	Sensory transduction and Elementary Neuronal Networks II: Signaling mechanisms. Modulation and Plasticity: Simple circuits to cognition	Ch 20-22	Dr. Sara Burke
10	April 16	EEG, Oscillations, and Rhythmicity	<i>TBA</i> <i>papers</i>	Dr. Andrew Maurer
11	April 18	Neuron-glia interactions in neurodegenerative disease	<i>TBA</i> <i>papers</i>	Dr. Paramita Chakrabarty
12	April 20	Epigenetic Modification and Plasticity: Clinical Implications Student project due	<i>TBA</i> <i>papers</i>	Dr. Barry Setlow
13	April 23	Novel tools for imaging and manipulating circuit function	<i>TBA</i> <i>papers</i>	Dr. Jeremy McIntrye
14	April 25	EXAM II		

Disclaimer: This syllabus represents our current plans and objectives. As we go through the semester, those plans may need to change to enhance the class learning opportunity. Such changes, communicated clearly, are not unusual and should be expected.

GRADING POLICIES:

Student Projects: 10%

Class participation 10%

Exam I: 35%

Exam II: 45%

COURSE POLICIES:

ATTENDANCE POLICY: *You are expected to attend each lecture and actively participate in the student projects.*

QUIZ/EXAM POLICY: *There are two exams in this course. They are in-class exams comprised primarily of multiple choice and short answer questions.*

STUDENT PROJECTS: *Each student will write one “Journal Club” on a paper of their choice that published within the last 12 months for 10% of final grade. This will follow the Journal of Neuroscience format (http://www.jneurosci.org/site/misc/ifa_features.xhtml) and should have three components: a short overview of the background of the reviewed paper, a critical data-based review of the key findings, and a brief summary of the significance of the paper. The Journal Club should focus on the most important results (it is not necessary to discuss each figure), and a successful paper will offer a critical evaluation the results in the context of other work. The length should be between 1200 and 1500 words. **These papers should be emailed to Dr. Burke by 5pm on April 20, 2018.***

MAKE-UP POLICY: *You are expected to notify the course directors of any anticipated absences. You should make every effort to take the exams on the days they are scheduled. If extenuating circumstances prevent you from taking a scheduled exam, you will need to schedule an appointment to meet with the course directors to identify an alternative exam date.*

UF POLICIES:

UNIVERSITY POLICY ON ACCOMMODATING STUDENTS WITH DISABILITIES: Students requesting accommodation for disabilities must first register with the Dean of Students Office (<http://www.dso.ufl.edu/drc/>). The Dean of Students Office will provide documentation to the student who must then provide this documentation to the instructor when requesting accommodation. You must submit this documentation prior to submitting assignments or taking the quizzes or exams. Accommodations are not retroactive, therefore, students should contact the office as soon as possible in the term for which they are seeking accommodations.

UNIVERSITY POLICY ON ACADEMIC MISCONDUCT: Academic honesty and integrity are fundamental values of the University community. Students should be sure that they understand the UF Student Honor Code at <http://www.dso.ufl.edu/students.php>

ABOUT THE LECTURERS

Dr. Sara Burke is Assistant Professor in the Department of Neuroscience and is a Co-director of the course.

Email: burkes@ufl.edu Phone: 352-294-4979

Dr. Tom Foster is Professor in the Department of Neuroscience and is a Co-director of the course. Email: tfoster1@ufl.edu Phone: 352-294-0033

Dr. Andrew Maurer is Assistant Professor in the Department of Neuroscience

Email: drewmaurer@ufl.edu Phone: 352-294-

Dr. W. J. Streit is Professor in the Department of Neuroscience

Email: pschorr@ufl.edu Phone: 352-392-3910

Dr. Jeremy McIntrye is Assistant Professor in the Department of Neuroscience

Email: jmcin@ufl.edu Phone:

Dr. Paramita Chakrabarty is Assistant Professor in the Department of Neuroscience

Email: pchakrabarty@ufl.edu Phone:

Dr. Barry Setlow is Professor in the Department of Psychiatry

Email: setlow@ufl.edu Phone: