BIOLOGY 450
INTRODUCTION TO NEUROBIOLOGY
Fall Semester, 2015

Course summary: Neurobiology is a vast, rapidly-progressing field of life science that focuses on the brain and nervous system. This course will provide an overview of principles, concepts, and current research in neurobiology and related fields. Lectures will encompass diverse topics such as cellular neurophysiology, neuroethology (the neurobiology of animal behavior), behavioral and sensory physiology, molecular biology of neurons and glial cells, learning and memory, and diseases of the nervous system.

Instructor (first half of course): Dr. Ken Lohmann, Coker Hall room 403
KLohmann@email.unc.edu

Instructor (second half of course): Dr. Jill Wentzell
Jill.Wentzell@duke.edu

Lectures: 11:15 to 12:05 on Monday, Wednesday, and Friday in room 128 of Wilson Hall. This course has no lab.

Textbook: Neuroscience: Exploring the Brain by Bear et al. (3rd edition; note that there is a 4th edition but we will not use it this year). Supplementary readings on specific topics will also be assigned; these will be available as PDFs on Sakai.

Office Hours: Dr. Lohmann’s office hours are Mondays from 12:15 to 1:15 p.m. In addition to the scheduled office hours, Dr. Lohmann will be available to answer questions for a short time immediately after each lecture.

E-mail contact: You are free to send e-mail to your instructors, but please be aware that professors sometimes receive as many as two hundred e-mail messages a day and cannot always respond promptly (or at all). A face-to-face conversation remains the most reliable and effective mode of communication and should be used whenever possible (you’ll have four chances most weeks -- three lectures plus office hours).

Grading: Grading will be based on the following:

<table>
<thead>
<tr>
<th>Component</th>
<th>Points</th>
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<tr>
<td>Hourly exams 1 and 2 (100 points/each)</td>
<td>200</td>
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<tr>
<td>A one-page, well-researched, well-written essay during first half of class</td>
<td>20</td>
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<tr>
<td>Hourly exam 3 (90 points)</td>
<td>90</td>
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<tr>
<td>In-class assignments during second half of class</td>
<td>30</td>
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<tr>
<td>Final Exam</td>
<td>100</td>
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<td><strong>Total Points</strong></td>
<td>440</td>
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Exam Dates:
- Wednesday, September 16
- Friday, October 9
- Exam 3 date: TBA by Dr. Wentzell
- FINAL EXAM: Friday, December 4 at noon

Note: In accordance with UNC policy, the final exam can only be taken at the designated time.

Essay assignment: At least five different topics for essays will be provided, each at a different time during the first half of the class. Students are required to select one of the topics and write a brief (one-page) essay in accordance with the directions for that particular assignment. Each essay will be due on a different date. Each student is required to complete one essay during the first half of the class.

Optional second essay: If a student turns in an essay for one of the first three topics and is dissatisfied with the grade, s/he may repeat the assignment and turn in a second essay on a different topic later in the semester. If the grade on the second essay is higher, it will replace the first grade. This option is only available to students who choose to turn in an essay about one of the first three topics.
TENTATIVE LECTURE SCHEDULE FOR FIRST HALF OF COURSE (expect changes):

W 8-19 Introduction to the course; anatomy of neurons
F 8-21 Electrical properties of neurons I: resting potentials, Nernst equation

M 8-24 Electrical properties of neurons II: Goldman equation, ion pumps
W 8-26 Ion channels, electrical gradients and behavior: paramecium movement
F 8-28 Action potentials, tetrodotoxin, and the strange case of zombies

M 8-31 Action potential propagation; neurobiology of local anesthesia
W 9-02 Electrophysiological techniques (intracellular/extracellular recording; EEG; MEG)
F 9-04 Brain-driven robots/neural interface systems; electrical and chemical synapses; neurotransmitters

M 9-07 No class; Labor Day
W 9-09 “Instant neuropharmacology”; EPSPs, IPSPs, summation
F 9-11 Neuroethology; neural circuitry underlying the escape swim of the sea slug Tritonia

M 9-14 Tritonia review; central pattern generators
W 9-16 Hourly Exam I
F 9-18 Ethology and behavioral physiology in neuroscience; detection of ocean waves by sea turtles

M 9-21 Neuroethology of cockroach escape behavior
W 9-23 Auditory system I: anatomy of the mammalian ear; tuning curves; auditory threshold functions
F 9-25 Auditory system II

M 9-28 Auditory system III: extreme auditory adaptations in the animal kingdom
W 9-30 Electroreception I: electrocytes; producing and detecting electric fields
F 10-02 Electroreception II: active and passive electroreception

M 10-05 Magnetoreception I: perception of magnetic fields
W 10-07 Magnetoreception II
F 10-09 Hourly Exam 2 (cumulative exam; covers first half of class)

M 10-12 No class; University Day
W 10-14 Dr. Wentzell’s first lecture
F 10-16 No class; fall break

Note: A syllabus for the second half of the semester will be provided later.