From Molecules to Mind - Molecular and Developmental Neurobiology

Winter 2012

Instructors:

Dr. Joshua Trachtenberg, Neurobiology  503 NR1  x50873
Office hours: Th, 4:00-5:00 PM or by appt.

Dr. Lars Dreier, Neurobiology  Gonda 3506C  x61701
Office hours: Th, 4:00-5:00 PM or by appt.

Dr. Felix E. Schweizer, Neurobiology  CHS 63-323  x45733
(Course Coordinator) Office hours: Th, 4:00-5:00 PM or by appt.

Teaching Assistants:

Lavanya Acharya  office hours: TBA at first section
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Course web page and discussion forum:
The web page is at: https://ccle.ucla.edu/course/view.php?id=25111. On the web site is a
discussion forum. We encourage you to post any questions you have on this site; answers will be
posted by the professors and TAs regularly. Using the discussion forum has the tremendous
advantage that any answers are available to everyone for the duration of the course. The lecture is
audio recorded and posted on the course website (Bruincast link on left menu).

Required Texts:

Accessory Texts:
Molecular Cell Biology, 5th Edition. (2003); Lodish et al., WH Freeman and Co., NY Library)

Course Description:
Lecture, 4 hrs.; Discussion, 1.5 hrs.: 5 units

Prerequisites: Life Sciences 3 and 4 (LS 4 may be taken concurrently) AND “A” series course
OR one of the following: Phy.Sci. M111A, Psych. 115.
Lectures:
Tu, Th: 2:00-3:50 PM, WG Young Hall CS 24

Discussion Sections:
All discussion sections meet in Geology 4645
Section 1A: 8:00-9:20 AM
Section 1B: 9:30-10:50 AM
Section 1C: 11:00 AM-12:20 PM
Section 1D: 12:30-1:50 PM
Section 1E: 2:00-3:20 PM
Section 1F: 3:30-4:50 PM

Grading:
Class grades will be based on total points earned as follows:
Three Midterm exams (1/30, 2/21, 3/22) 250 points (85, 85, and 85 points)
Six graded Discussion Sections 42 points
Attendance at 2 seminars 8 points
TOTAL 305 points

Exams:
The 3 exams are non-cumulative in content.
End of module 1: 85 points, Monday, Jan. 30th, 6-8 7-9 PM, Location TBD
End of module 2: 85 points, Tuesday Feb. 21st, 2-4 PM, CS 24
End of Module 3: 85 points, Thursday, March 22nd, 11:30am – 2:30pm, Location TBD

Warning: Cheating on an exam or any other section of class will result in a score of 0 for that exam/task and notification of the office of the Dean of Students for further disciplinary action.

Discussion sections:
If you prefer a discussion section different from the one that you have been assigned, you may request reassignment, during Week 1 ONLY, from Melissa Moran (MMoran@mednet.ucla.edu OR 206-2349), room 1506D Gonda.

Policy on missing discussion sections:
We understand that there are valid circumstances that may cause you to be absent from a discussion section (for instance, interviews). In order to ensure that you get credit for a missed discussion section you must 1) present a valid reason to the TA in advance and 2) turn in the assignment before the discussion section. There will be no flexibility in this policy.

Graded Assignments for discussion sections: The discussion sections are useless if you have not read the assigned article. To help motivate you to read each article, you are required to turn in a paper for each of the 6 discussion sections in which papers are assigned (weeks 1,2,4,5,7,8) using Turnitin. These papers will be graded from 0-5 points by your TAs. The papers are due on the day of the discussion section in which the reading assignment is discussed. They must be turned in before the discussion section starts. In addition, points will be assessed for attendance (1 point per session) and participation (1 point per session). This gives a maximum total of 42 points.

Assignments for discussion section should be typed and no more than one page. The assignments should consist of 2 parts:
1) in one paragraph, summarize the main ideas of the article – why were experiments done; briefly, how were they done; what were the results and conclusions?
2) in a longer section, describe your ideas, including criticism and/or praise of the article if appropriate and suggested future experiments to resolve important issues.

Lastly, plagiarism is cheating! Any indication that you have copied work from a fellow student will result in a 0 for that assignment for both students and notification of the Dean’s Office. Copying text directly from the article (or the web) without proper attribution does constitute plagiarism.

Seminar attendance:
Each student is required to attend two Neuroscience seminars during the quarter and to turn in a written summary for each using Turnitin. One seminar must be attended prior to the end of the 6th week and the summary is due at or before the discussion section on that day. The second seminar may be at any time before the final discussion section and must be turned in before or at that session. The summary should be typed, no longer than one paragraph, and should convince the TA that you attended and paid attention to the seminar. Make sure that this paragraph is in your own words. If the TA is unconvinced that you attended or that you have written your report independently, you will receive no credit (hint: sometimes seminars are cancelled). Each seminar write-up is worth 4 points for a total of 8 points. Upcoming neuroscience seminars will be listed under “Neuroscience seminars” at the web site: http://www.neurosci.ucla.edu/seminars.asp. In addition, we will try to periodically post upcoming seminars at the beginnings of lectures.
UCLA is a community of scholars. In this community, all members including faculty, staff and students alike are responsible for maintaining standards of academic honesty. As a student and member of the University community, you are here to get an education and are, therefore, expected to demonstrate integrity in your academic endeavors. You are evaluated on your own merits. Cheating, plagiarism, collaborative work, multiple submissions without the permission of the professor, or other kinds of academic dishonesty are considered unacceptable behavior and will result in formal disciplinary proceedings usually resulting in suspension or dismissal.

**Forms of Academic Dishonesty**

As specified in the UCLA Student Conduct Code, violations or attempted violations of academic dishonesty include, but are not limited to, cheating, fabrication, plagiarism, multiple submissions or facilitating academic dishonesty (see below for detailed definitions).

While you are here at UCLA, you may find yourself in a situation where cheating seems like a viable choice. You may rationalize to yourself that "Everyone else does it" Well, they don't. And will that matter when YOU get caught? NO! If you are unsure whether what you are considering doing is cheating, just ask yourself ...... how would you feel if your actions were public, for anyone to see? Would you feel embarrassed or ashamed? If the answer is yes, that’s a good indicator that you are taking a risk and rationalizing it to yourself.

If after reviewing the information below, you are still unclear about any of the items – don’t take chances, don’t just take your well-intentioned friend’s advice – ASK your TA or your Professor. Know the rules - Ignorance is NO defense. In addition, avoid placing yourself in situations which might lead your TA or Professor to suspect you of cheating. For example, during an exam don’t sit next to someone with whom you studied in case your answers end up looking "too similar."

**Alternatives to Academic Dishonesty**

* Seek out help – meet with your TA or Professor, ask if there is special tutoring available.

* Drop the course – can you take it next quarter when you might feel more prepared and less pressured?

* Ask for an extension – if you explain your situation to your TA or Professor, they might grant you an extended deadline.

* See a counselor at Student Psychological Services, and/or your school, college or department – UCLA has many resources for students who are feeling the stresses of academic and personal pressures (see below).

Remember, getting caught cheating affects more than just your GPA. How will you explain to your parents, family and friends that you have been suspended or dismissed? How will it affect your financial aid award and/or scholarship money? Will you be required to, and be able to pay back that money if you are no longer a student? If you live in the residence halls, where will you go if you are told you can no longer live there?
You have worked very hard to get here, so don’t cheat! If you would like more information, please come see us at the Dean of Students’ Office in 1206 Murphy Hall, call us at (310) 825-3871 or visit our Web site at www.deanofstudents.ucla.edu.

**Cheating**

- Unauthorized acquiring of knowledge of an examination or part of an examination
- Allowing another person to take a quiz, exam, or similar evaluation for you
- Using unauthorized material, information, or study aids in any academic exercise or examination – textbook, notes, formula list, calculator, etc.
- Unauthorized collaboration in providing or requesting assistance, such as sharing information
- Unauthorized use of someone else’s data in completing a computer exercise
- Altering a graded exam or assignment and requesting that it be regraded

**Plagiarism**

Presenting another’s words or ideas as if they were one’s own

- Submitting as your own through purchase or otherwise, part of or an entire work produced verbatim by someone else
- Paraphrasing ideas, data or writing without properly acknowledging the source
- Unauthorized transfer and use of someone else’s computer file as your own
- Unauthorized use of someone else’s data in completing a computer exercise

**Multiple Submissions**

Submitting the same work (with exact or similar content) in more than one class without permission from the instructor to do so. This includes courses you are currently taking, as well as courses you might take in another quarter

**Facilitating Academic Dishonesty**

Participating in any action that compromises the integrity if the academic standards of the University; assisting another to commit an act of academic dishonesty

- Taking a quiz, exam, or similar evaluation in place of another person
- Allowing another student to copy from you
- Providing material or other information to another student with knowledge that such assistance could be used in any of the violations stated above (e.g., giving test information to students in other discussion sections of the same course)

**Fabrication**

Falsification or invention of any information in an academic exercise

- Altering data to support research
- Presenting results from research that was not performed
- Crediting source material that was not used for research
Places to go for help when you are feeling overwhelmed and need personal and/or academic assistance:

(In addition to the resources listed below, you can get assistance from a counselor in your college/dept., check out the current schedule of classes under "Academic Counseling" to find the location and phone number)

* **Letters & Science Counseling Service**  
  A316 Murphy Hall: (310) 825-1965  
  www.college.ucla.edu

* **Academics in the Commons**  
  at Covel Commons: (310) 825-9315  
  free workshops on a wide variety of issues relating to academic & personal success  
  www.orl.ucla.edu (click on "academics")

* **College Tutorials**  
  at Covel Commons: (310) 825-9315  
  free tutoring for ESL/math & science/composition/and more!  
  www.college.ucla.edu/up/ct/

* **Lesbian, Gay, Bisexual and Transgender Resource Center**  
  220 Kinsey Hall: (310) 206-3628  
  www.lgbt.ucla.edu

* **Office for Students with Disabilities**  
  A255 Murphy Hall: (310) 825-1501,  
  TDD (310) 206-6083  
  www.saonet.ucla.edu/osd

* **Office of International Students and Scholars**  
  106 Bradley Hall: (310) 825-1681  
  www.intl.ucla.edu

* **Student Legal Services**  
  70 Dodd Hall: (310) 825-9894  
  www.studentlegal.ucla.edu

* **Student Psychological Services**  
  4223 Math Sciences: (310) 825-0768  
  A3-062 Center for Health Sciences:  
  (310) 825-7985  
  www.saonet.ucla.edu/sps.htm

* **Center for Women and Men**  
  2 Dodd Hall: (310) 825-3945  
  www.thecenter.ucla.edu

* **Dean of Students Office**  
  1206 Murphy Hall: (310) 825-3871  
  www.deanofstudents.ucla.edu
Module 1 – Dr. Joshua Trachtenberg

DON’T SWEAT THE DETAILS ON READINGS. I’LL GIVE YOU THE DETAILS IN LECTURE. JUST READ THROUGH FOR THE BIG PICTURE.

WEEK 1

Tu, January 10, 2012
Lecture: Nervous system development/Regional Patterning – neurulation
the organizer and neural inducers, anterior-posterior axis.
Reading: Sanes, Chapter 1, pp. 7-28, including the Box, Chapter 2, pp.29-46

Th, January 12, 2012
Lecture: Regional Patterning II / Neurogenesis & Migration – Dorsoventral axis, generation of neurons and glia, cellular migration
Sanes, Chapter 2, pp. 46-56, Chapter 3, NOT the Boxes

Fr, January 13, 2012
Discussion:

WEEK 2

Tu, January 17, 2012
Lecture: Determination and Differentiation / Cell Polarity/Axon Growth
Reading: Sanes, Chapter 4, Chapter 5, pp. 111-123.

Th, January 19, 2012
Lecture: Axon Guidance / Target Selection
Sanes, Chapter 5, pp. 123-138 & Box 3 (pp. 142-144). Chapter 6.

Fr, January 20, 2012
Discussion:

WEEK 3
Tu, January 24, 2012
Lecture: Neuron Death / Synapse Formation.
Reading: Sanes, Chapter 7, Chapter 8, pp. 207-230. NOT the Boxes

Th, January 26, 2012
Lecture: Review for Exam
NOTE: You will be held responsible for both of the discussion papers on the exam.

Fr, January 27, 2012
Discussion: Review session for Exam

Monday January 30, 2012, 6-8 7-9 PM, TBA  MIDTERM EXAM, MODULE 1
Module 2 – Dr. Lars Dreier

WEEK 4

Tu, January 31, 2012

Guest Lecture: Dr. Joanna Jen – Insights into brain development from patients with rare inherited disorders

Lecture: Voltage gated channels 1. Review of action potential; basic parts of an ion channel; transmembrane topology and stoichiometry of voltage gated ion channels; permeability and ion selectivity; structure / function of the channel pore.

Reading: Bear, pp. 80-92 and 67-70.

Th, February 2, 2012

Lecture: Voltage gated channels 2. Structure / function of the voltage sensor (S4 region); inactivation mechanisms – the “ball and chain” model, ion pumps and the Na⁺ /K⁺ ATPase.


Fr, February 3, 2012


WEEK 5

Tu, February 7, 2012

Lecture: Ligand-gated channels 1. Acetylcholine receptors and glutamate receptors.

Reading: Bear, pp 111-126, 138-141, 152-156.

Th, February 9, 2012

Lecture: Ligand-gated channels 2. GABA and glycine receptors.

Reading: Bear, pp.126-128, 156-157, 670-671

Fr, February 10, 2012

WEEK 6

Tu, February 14, 2012
Lecture: **TRP channels.** TRP channels are critical for the sensations of touch, pain, taste, hearing, and smell.

Th, February 16, 2012
Lecture: **G protein-coupled receptors.** Basic structure of G protein-coupled receptors; basic mechanism of G protein cascades.
Reading: **Bear,** pp. 157-165, 111-112, 118-119, 148-152.

Fr, February 17, 2012
Discussion: Review section for the Module 2 midterm exam.
Note: First Seminar paper due!

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WEEK 7

Tu, February 21, 2012

| Tuesday, February 21, 2012, 2-4 PM, CS 24 | MIDTERM EXAM, MODULE 2 |
Module 3 – Dr. Felix Schweizer

WEEK 7 continued

Th, February 23, 2012
Lecture: Synaptic Transmission I. Electrical and chemical transmission.
Reading: Bear, Chapter 5, pp. 101-108.

Fr, February 24, 2012
Discussion: No discussion section!

WEEK 8

Tu, February 28, 2012
Lecture: Neurotransmitters and calcium dependence of release.
Reading: Bear, Chapter 6, pp 141-152. Bear Chapter 5, 106-109, 111-117.

Th, March 1, 2012
Lecture: Synaptic Transmission II. Molecular Mechanisms.
Reading: Bear, Chapter 5, pp. 111-117.

Fr, March 2, 2012
Discussion:
del Castillo & Katz (1954) “Quantal components of the end plate potential.” J. Physiol. 124, 560-573

WEEK 9

Tu, March 6, 2012
Lecture: Neuronal structure and cytoskeleton.
Reading: Bear Chapter 2, pp. 35-45.

Th, March 8, 2012
Lecture: Microtubules, Dendrites and Spines.
Reading: Bear Chapter 2, pp. 35-45.

Fr, March 9, 2012
WEEK 10

Tu, March 13, 2012

Lecture:  *Cells, Networks and Plasticity.*
Reading:  *Bear, Chapter 24, pp 716-723.*

Th, March 14, 2012

2-~3pm Guest Lecture: Prof. Beate Ritz, MD, PhD, School of Public Health. Epidemiology and neurodegenerative diseases.
~3-3:50pm Review session

Thursday, March 22, 2012, 11:30am – 2:30pm, Location TBD

MIDTERM EXAM, MODULE 3