From Molecules to Mind - Molecular and Developmental Neurobiology

Winter 2006

Instructors:

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

Dr. Lars Dreier, Neurobiology  CHS 63-251 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:

Tim Indersmitten  office hours: TBA at first section x64852
timi@ucla.edu

Suren Ambegaokar  office hours: TBA at first section x54046
surenamb@ucla.edu

Hope Johnson  office hours: TBA at first section x45012
hope1@ucla.edu

Course web page and bulletin board:
The web page is at: http://www.lsic.ucla.edu/classes/fall05/. On the web site is a bulletin board. We encourage you to post any questions you have on this bulletin board; answers will be posted by the professors and TAs regularly. Using the bulletin board has the tremendous advantage that any answers are available to everyone for the duration of the course.

Required Texts:

Accessory Texts:

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

Lectures:
Tu, Th: 2:00-3:50 PM, MS4000A.

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

Grading:
Class grades will be based on total points earned as follows:
Three Midterm exams (1/29, 2/20, 3/16): 250 points (80, 85, and 85 points)
Six graded Discussion Sections: 42 points
Attendance at 2 seminars: 8 points
TOTAL: 300 points

Exams:
The 3 exams are non-cumulative.
End of module 1: 80 points, Monday, Jan. 29th, 6-8 PM, place TBA
End of module 2: 85 points, Tuesday Feb. 20th, 6-8 PM place TBA.
End of Module 3: 85 points, Tuesday March 16th, 2:00 PM-3:50 PM, in normal lecture room

Warning: Cheating on an exam will result in a score of 0 for that exam 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 from Erin Fletcher (efletcher@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). These papers will be graded from 0-5 points. The papers are due on the day of the discussion section in which the reading assignment is discussed. 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 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.

Seminar attendance:
Each student is required to attend two Neuroscience seminars during the quarter and to turn in a written summary for each. One seminar must be attended prior to the end of the 6th week (Fr, February 15th) 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 (Fr, March 9th) 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. Each seminar writeup 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.lifesci.ucla.edu/neurosci/. In addition, we will try to periodically post upcoming seminars at the beginnings of lectures.
Academic Integrity
(Copied from http://www.deanofstudents.ucla.edu/Syllabus%20sheet%20099.html)

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

WEEK 1

Tu, January 9, 2007

Lecture: Nervous system development/Regional Patterning II – Gastrulation, 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 11, 2007

Lecture: Regional Patterning II / Neurogenesis & Migration – Dorsoventral axis, generation of neurons and glia, cellular migration

Reading: Sanes, Chapter 2, pp. 46-56, Chapter 3, NOT the Boxes


Fr, January 12, 2007

Discussion:

WEEK 2

Tu, January 16, 2007

Lecture: Determination and Differentiation / Cell Polarity/Axon Growth

Reading: Sanes, Chapter 4, Chapter 5, pp. 111-123.


Th, January 17, 2007

Lecture: Axon Guidance / Target Selection

Reading: Sanes, Chapter 5, pp. 123-138 & Box 3 (pp. 142-144). Chapter 6.
Fr, January 19, 2007
Discussion:

WEEK 3
Tu, January 23, 2007
Lecture: Neuron Death / Synapse Formation.
Reading: Sanes, Chapter 7, Chapter 8, pp. 207-230. NOT the Boxes

Th, January 25, 2007
Lecture: Refinement of Synaptic Connections at the neuromuscular junction, autonomic ganglia, cerebellum, tectum and cortex
Reading: Sanes, Chapter 9.


Fr, January 26, 2007
Discussion: Review session for Exam

Monday January 29, 2007, 6-8 PM MIDTERM EXAM, MODULE 1
Module 2 – Drs. Lars Dreier & Felix E. Schweizer

WEEK 4

Tu, January 30, 2007

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. 52-58 and 65-69 (review pp. 58-65). This may help: optional reading in the Reader, “Principles of selective ion transport in channels and pumps” by Gouaux & MacKinnon.

Th, February 1, 2007

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.

Reading:  Bear, Chapter 4. This may help: optional reading in the Reader “A one-domain voltage-gated sodium channel in bacteria” by Catterall.

Fr, February 2, 2007


This may help: “Snake sodium channels resist TTX arrest”, an accompanying Perspective by Huey and Moody.

WEEK 5

Tu, February 6, 2007

Lecture:  Ligand-gated channels 1. Transmembrane topology and stoichiometry of ligand-gated ion channels; acetylcholine receptors and glutamate receptors.


Th, February 8, 2007

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


Fr, February 9, 2007

Discussion: Zagotta WN, Hoshi T, Aldrich RW (1990) Restoration of inactivation in mutants of Shaker potassium channels by a peptide derived from ShB. Science 250: 568-571.

This may help: “Playing tetherball in the nervous system”, an accompanying research news article by M. Barinaga.
WEEK 6

Tu, February 13, 2007

Lecture:  
*G protein-coupled receptors.* Basic structure of G protein-coupled receptors; basic mechanism of G protein cascades.

Reading:  
This may help: optional reading in the *Reader,* “Endocannabinoid signaling in the brain” by Wilson & Nicoll.

Th, February 14, 2007

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

Reading:  

Fr, February 15, 2007

Discussion: Review section for the Module 2 midterm exam.
Note: First Seminar paper due!

WEEK 7

Tu, February 20, 2007

Lecture:  
Dr. Joanna Jen will present a lecture on “channelopathies”.

Tuesday, February 20, 2006, 6-8 PM  MIDTERM EXAM, MODULE 2
Module 3 – Dr. Felix Schweizer

WEEK 7 continued

Th, February 22, 2007
Lecture:  *Neuronal polarity and cytoskeleton 1.* Microtubules, intermediate filaments and associated proteins; axonal transport.
Reading:  *Bear* Chapter 2, pp. 26-49.

Fr, February 23, 2007
Discussion: No discussion section!

WEEK 8

Tu, February 27, 2007
Lecture:  *Neuronal polarity and cytoskeleton 2.* Dynamic dendrites and diseases.
Reading:  *Bear*, Chapter 2, pp. 26-49.

Th, March 1, 2007
Lecture:  *Synaptic Transmission I.* Electrical and chemical transmission.

Fr, March 2, 2007
Discussion: Paper to be determined

WEEK 9

Tu, March 6, 2007
Lecture:  *Synaptic Transmission II.* Molecular Mechanisms and Calcium Dependence.

Th, March 8, 2007
Lecture:  *Synapses and Neurotransmitters.* Synaptic diversity and neurotransmitter synthesis

Fr, March 9, 2007
Discussion: Paper to be determined
Note: Second seminar paper due.
WEEK 10

Tu, March 13, 2007

Lecture: Synaptic Plasticity.
Reading: Bear Chapter 24, pp 791-803.

March 16, 2006, 2-3:50 PM (i.e. normal class meeting time & place)

MIDTERM EXAM, MODULE 3