

NSCI 327, Cellular, Neurophysiological and Pharmacological Neuroscience, SPRING 2008  
Prerequisites: NSCI 210, PSYC 375.

INSTRUCTOR: K Blackwell

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Office Hours: Thurs, 1:30 - 2:30 pm, or by appointment

Office Location: Krasnow Institute, Room 105

Course Objectives: This is a core neuroscience course that presents basic concepts of cellular and molecular level neuroscience. It is an in depth survey of neuronal functions, including cellular anatomy and membrane functions, electrical properties of neurons, intercellular and intracellular signaling, brain metabolism, the molecular biology of sensory processing, and cellular basis of plasticity. By the end of the course the students will have a comprehensive understanding of the molecular functioning of neurons.

Text: Neuroscience 4/e, Purves et al

Nerveworks: Computer simulations and workbook

## SYLLABUS

Week 1	Chapter 1
Jan 22:	Course overview, organization of the nervous system, amino acids and proteins
Jan 24:	Neuron anatomy and Structure, cytoskeleton
Week 2	
Jan 29	Chapter 2:25-36; Resting potential, Nernst Equation; Measurement Techniques
Jan 31	Chapter 4:74-83; Membrane transporters
Week 3	
Feb 5	Chapter 2:36-37; Chapter 3: 41-49: Structure of Ion channels
Feb 7	Chapter 4: 61-74; Function of Ion Channels
Week 4	
Feb 12	Tutorials: action potential, voltage clamp
Feb 14	Other Ion Channels and Function, tutorial: KA channel, KCa channel
Week 5	
Feb 19	Chapter 3: 49-59; Passive propagation of potential
Feb 21	Review, Commercial
Week 6	
Feb 26	<b>Exam 1: Chapters 1-4</b>
Feb 28	Chapter 5: 85-106; Synaptic transmission, pre-synaptic release
Week 7	
Mar 4	Chapter 5: 106-117; Synaptic transmission, Post-synaptic receptors and potentials
Mar 6	Chapter 6: 119-151; Synaptic transmission, neurotransmitters and synthesis

Week 8	Spring Break
Week 9	
Mar 18	Chapter 6: 119-151; Synaptic transmission, neurotransmitters and synthesis
Mar 20	Chapter 7: 153-163; Molecular signaling, indirect synaptic transmission
Week 10	
Mar 25	Chapter 7: 164-176; Molecular signaling, indirect synaptic transmission
Mar 27	Review, commercials
Week 11	
Apr 1	<b>Exam 2: Chapters 5-7</b>
Apr 3	Chapter 8: 177-203; Synaptic plasticity, Learning and Memory
Week 12	
Apr 8	Chapter 8: 177-203; Synaptic plasticity, Learning and Memory
Apr 10	Chapter 9: 207-217; Mechanotransduction (somatosensory)
Week 13	
Apr 15	Chapter 11: 253-286; Phototransduction (vision)
Apr 17	Chapter 11: 253-286; Phototransduction (vision)
Week 14	
Apr 22	Chapter 13: 313-332; Mechanotransduction (Hearing)
Apr 24	Chapter 15: 353-378, 384-389; Chemotransduction (taste and smell)
Week 15	
Apr 29	Chapter 15: 353-378, 384-389; Chemotransduction (taste and smell)
May 1	Review, commercials

### **Comprehensive Final Exam**

#### **Important dates:**

Last day to add: February 5

Last day to drop: February 22

## GRADING

Homework 20%

Mid-term Exams, 25%

Final Exam 30%

Exams will be short answer, or fill in the blank.

**Commercials** are brief presentations (e.g. 5 minutes) by teams of one to four students. The commercial should “sell” the neuron on a particular ion channel or transporter (commercial 1), synaptic receptor or receptor channel (commercial 2), or sensory cell (commercial 3). Content counts for 33%, verbal creativity counts for 33% and visual creativity counts for 33%. Larger teams are expected to have more entertaining commercials, but content is graded the same for all teams. Students form their own teams and each student in the team receives the same grade. If students are not happy with all members of their team, the team composition can change for the subsequent commercial. Teams of two to three students are recommended, but students who are unable to join a team, for example due to time or distance constraints, may create their own commercials. In this case, content will count for 50% and creativity for 50%.

Homework will consist of take home questions, and computer simulations (NerveWorks) with accompanying worksheets.

Policy regarding missed assignments: Homework may be turned in at most one week late, but there will be an automatic penalty of 10% deducted from the score. If an absence from class is anticipated, homework may be emailed, faxed, or sent in on-time with another student. Make-up exams are not allowed, unless the student has written medical documentation for absence from an exam.

Grading policy: A score of 90 or above generally results in a grade of A- or above, 80 or above corresponds to a B- or above, and 70 or above results in C- or above. The numerical score is only a guideline, and is not absolute. The final grades may be determined on a curve if this is to the students favor and justified in the opinion of the instructor.

STUDENTS WITH DISABILITIES SHOULD PROVIDE DOCUMENTATION FROM THE DISABILITIES OFFICE AND APPROPRIATE ARRANGEMENTS WILL BE MADE.

## HONOR CODE:

All exams and reports must follow the guidelines of the GMU Honor Code as described in the GMU catalog. Students may use books, notes, and other sources in preparing for exams and reports. Other students may be consulted. However, when taking exams, no books, notes, or student interaction will be allowed. Students may work together on homework, but each student must contribute and copying is not allowed.