

# BIO 418/518 Integrative Neuroscience

## Spring '09

This course examines the major functions of the nervous system, perception and motor control, at molecular, cellular, and systems levels. In addition, it considers the neural basis of behavior, and the cellular and molecular basis of neural diseases. At the end of the course, students should be able to (1) describe the cellular basis of sensory transduction for all the major senses, (2) identify how sensory information is transformed by the brain, (3) describe the ways that motor commands are initiated in the brain and carried out, (4) describe how the brain develops and the molecular signaling pathways involved, and (5) identify the current understanding of the basis for major neural diseases.

Prerequisite: BIO 417/517

Time and Location: MWF 9–9:50, NSC 218

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Textbook: Neuroscience (Fourth Edition) by Purves et al.

Grading: Letter grades will be determined from 4 in-class midterms of 100 points each (400 total points). An optional comprehensive final will also be offered. The final will be worth 100 points, and, if it is higher, will replace the lowest midterm grade. Your grade cannot be hurt by taking the comprehensive. No extra credit will be given.

Grading scale:  $\geq 360=A$ ,  $320-360=B$ ,  $280-320=C$ ,  $240-280=D$ ,  $<240=F$

Makeup policy: Make-up exams are allowed only for medical reasons. To schedule a makeup exam, you must submit a signed doctor's note explaining why you could not attend the exam at the normal time. The note must include the doctor's name and phone number for verification. If you must miss an exam for a non-excused reason, you may take the optional comprehensive final to replace the missed exam. There will be no makeup for the comprehensive exam.

It is each student's responsibility to attend lecture, take notes, and study the material covered. Each student is responsible for any announcement given in class.

## Bio 518

This portion of the course is to give graduate students better insight into the current literature, by analyzing recent or seminal papers in great detail. Recitation sections will be held semi-weekly, and will be based on 1 or 2 papers. Papers are chosen by the professors and are related to the recent topics in the lecture part of the course. Be prepared to answer detailed questions related to the importance of the paper, the methods used, the experimental findings, and the significance of the study. The grade for 518 will be based on performance on the exams (400 points) plus in recitations (133 points).

## Lecture Outline

<u>Class</u>	<u>Date</u>	<u>Topic</u>	<u>Lecturer</u>
1	1/12/2009	Chemical senses	KM
2	1/14/2009	Chemical senses	KM
3	1/16/2009	Chemical senses	KM
		MLK Day - no class	
4	1/21/2009	Hearing I: Ear	X-F
5	1/23/2009	Hearing II: Hair cells	X-F
6	1/26/2009	Hearing III: Central	X-F
7	1/28/2009	Behavior I: Sound localization	X-F
8	1/30/2009	Behavior II: Echolocation	X-F
9	2/2/2009	Behavior III: Vocal communication	X-F
10	2/4/2009	Vestibular	X-F
11	2/6/2009	Electrosense I	X-F
12	2/9/2009	<b>Exam 1</b> (lectures 1–10)	KM/X-F
13	2/11/2009	Electrosense II	X-F
14	2/13/2009	Motor I: Periphery	SM
15	2/16/2009	Motor II: Central control	SM
16	2/18/2009	Motor III: Coordination	SM
17	2/20/2009	Motor IV: Autonomic/visceral	SM
18	2/23/2009	Formation of the early nervous system: neural induction	X-F
19	2/25/2009	Formation of the brain: the major subdivisions	X-F
20	2/27/2009	Neurogenesis & differentiation	X-F
21	3/2/2009	Critical periods	X-F
22	3/4/2009	Neuronal activity and the formation of neural circuits	X-F
23	3/6/2009	<b>Exam 2</b> (lectures 11–22)	SM/X-F
		Spring Break - no class	
24	3/16/2009	Axonal transport	G
25	3/18/2009	Axon guidance	G
26	3/20/2009	Neurotrophic factors	G
27	3/23/2009	Alzheimer's disease/Taupathies	G
28	3/25/2009	Huntington's disease/other polyQ disease	G
29	3/27/2009	Parkinson's disease	G
30	3/30/2009	ALS	G
31	4/1/2009	Prion disease	G
32	4/3/2009	Fragile X syndrome	G
33	4/6/2009	<b>Exam 3</b> (lectures 24–31)	G
34	4/8/2009	Autism	G
35	4/10/2009	Repair and regeneration I	G
36	4/13/2009	Repair and regeneration II	G
37	4/15/2009	Therapies	G
38	4/17/2009	Stem cells I	G
39	4/20/2009	Stem cells II	G
40	4/22/2009	Lab visits I	G,KM,
41	4/24/2009	Lab visits II	SM,X-F
42	4/27/2009	<b>Exam 4</b> (lectures 32–39)	G