PSYC64S
BRAIN MECHANISMS AND BEHAVIOR III:
SENSORY AND MOTOR SYSTEMS
Course outline: Spring 1995

Instructor:
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Classrooms and scheduled times:

M 1400-1600	Room S-143
F 1000-1100	Room H-305

Tutorials: (tentative)

F 1200-1300	Room H402
T 1100-1200	Room R4031

Course description:

This course focuses on the neurobiology of sensory and motor systems. The goal will be to understand how the external world is encoded (sensory coding), recognized (perception) and manipulated (motor control). The first topic covered will be sensory coding. It deals with the organizational principle of the nervous system, and how they are used to encode our environment. Next, we will discuss vision. The topics discussed will include: image formation, visual transduction, retinal coding and cortical processing.

Hearing will follow vision. We will discuss how sound is transduced and coded. We will also look at the role of the auditory cortex in auditory memory. One two hour lecture will be devoted to the vestibular system and oculomotor control. The

lecture will be given by Dr. Dianne Broussard, whose main research interests are in eye movement control and the vestibular system. Depending on time constraints, the somatosensory system (touch, itch, thermosensitivity, kinesthesia, proprioception, pain), olfactory system and gustatory system will conclude this part of the course.

The last topic, motor control, will be covered in three parts: (1) direct control over muscle contraction; (2) central pattern generation and (3) development and initiation of motor programs.

Course materials:

There is no assigned texbook. Detailed lecture notes will be available for vision, audition, olfaction, taste, movement (and hopefully somatosenses). The students will be responsible for all material covered in lectures and for the assigned readings.

Tutorials:

Tutorials will meet either weekly. They will be used to:
1. organize group projects.
2. discuss lecture material and assigned readings.

Grading will be based on two midterms ([redacted]) worth 40%, a final exam worth 40% and on a tutorial grade worth 20 %.

The tutorial grade will be based on class:

Class participation	5%
Projects	15%

Assigned readings:

Freeman, W.J. The physiology of perception. Feb. 1991, 78-85.

Hinton, G.E. How neural networks learn from experience. Scientific American, Sept 1992, 145-151

Houk, J.C., Keifer, J., & Barto, A.G. Distributed motor commands in the limb premotor network. Trends in Neuroscience, 1994, 16, 27-33.

Konishi, M. Listening with two ears. Scientific American, April 1993, 268, 66-73.

Leigh, R.J., & Zee, D.S. The vestibulo-optokinetic system. In: The neurology of eye movements, Chapter 2, pp 11-25.

Lisberger, S.G. (1988). The neural basis for motor learning in the vestibular ocular reflex in monkeys. Trends in Neuroscience, 11, 147-151.

Masland, R.H. The functional architecture of the retina. Scientific American

Melzack, R. The tragedy of needless pain. Scientific American Feb. 1990, 262, pp27-33.

Morton, D.W., & Chiel, H.J. Neural archictectures for adaptive behavior. Trends in Neuroscience, 1994, 17, 413-419.

Nathans, J. The genes for color vision. Scientific American Feb. 1989, pp 42-48.

Schedule

The following schedule is somewhat tentative, the section on the somatosensory system may or may not be included, depending on how much time is required to cover the vision and audition. The exam dates, however, are firm.

Week	Topic	Assigned Readings
1 - Jan 2	Introduction Sensory Coding The Visual Stimulus	Hinton (1992) Chapter 8 - Notes
2 - Jan 9	Viual transduction Retinal coding	Masland Nathans
3 - Jan 16	Processing in CNS: Visual system modules	
4 - Jan 23	**Jan 27 - Midterm # 1**	
5 - Jan 30	Audition: Peripheral Mechanisms	Chapter 9
6 - Feb 6	Vestibular system Vestibular ocular reflexes **Guest Lecture: Dr. Diane Broussard**	Leigh & Zee Lisberger
Feb 13 - 17	*No classes. Reading week*	
7 - Feb 20	Auditory system: Central Mechanisms Somatosensory system	Konishi
8 - Feb 27	Somatosensory system	Melzack

Second Midterm: March 3

9 - Mar 7	Olfaction	Freeman Notes: Chapter 11
10 - Mar 14	Taste	
11- Mar 21	Movement - Peripheral mechanisms	Notes: Chapter 12
12 - Mar 28	Movement - Central Pattern Generators	Morton &Chiel
13 - Apr 4	Movement - Motor Programs	Houk, et al