

## **Sensory Physiology**

Bi353

Fall Term 2013

**Lectures** 2-2:50pm MWF 16 Pacific Hall (CRN 11913)

**Lab/Discussion Section 1** (CRN 11914)

11-11:50 AM, F 111 Huestis

**Lab/Discussion Section 2** (CRN 11915)

12-12:50 PM, F 111 Huestis

**Instructor: Terry Takahashi**

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**GTF: Mr. Andrew Cvitanovich**

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office hours: to be specified

**Text:** Kandel et al. *Principles of Neural Science* (4<sup>th</sup> Edition)

Sensory physiology is the study of how information arriving through the sensory organs is processed to produce perception. As you can see from our course schedule below, the emphasis is on the sensory systems that are best understood – somatosensory, auditory, and visual. For each sense modality, we start with the process of transduction, whereby physical energy is converted into neural impulses, and then, attempt to understand the neural basis of perception. In studying perception, we will concentrate on those that are best understood in terms of neural mechanisms.

The discussion section, held on Fridays, will be spent discussing journal articles and reviewing for tests. The journal articles that we will cover are listed below (see schedule and journal listing below). You are responsible for all material covered in the discussions.

Your grade is based on an average of the scores of three tests. The questions will be of the short-answer and multiple-choice types. Materials covered in lecture, readings, and discussions will be covered in the tests. To be successful in this class, you must keep up with the material. If you have any questions, ask immediately. The grading scale is as follows:

- A 100 - 90
- B 89 - 80
- C 79 - 70
- D 69 - 60
- F Below 59

Exams *must* be taken at the time and place scheduled. There are no early or make-up exams, except in the case of a medical emergency.

The University of Oregon is working to create an inclusive learning environment. Please notify me, within the first 2 weeks of class, if you have a disability that could impede your learning experience in this class. Please contact Disability Services for further information (164 Oregon Hall; 6-1155 or [disabserv@uoregon.edu](mailto:disabserv@uoregon.edu)). I will work with you and Disabilities Services to help facilitate your learning experience.

## Approximate Schedule

Lec #	Date	Topic	Text chapter
1	<b>Monday, September 30, 2013</b>	Basic neurobiology	
2	Wednesday, October 02, 2013	Basic neurobiology	
3	Friday, October 04, 2013	Basic neurobiology	
Disc.	Friday, October 04, 2013	<i>No Discussion section</i>	
4	<b>Monday, October 07, 2013</b>	Basic neurobiology	
5	Wednesday, October 09, 2013	Somatosensory system	Ch 21-24 pg 384-92
6	Friday, October 11, 2013	Somatosensory system	
Disc.	Friday, October 11, 2013	Clark et al. '88; Wang et al. '95	
7	<b>Monday, October 14, 2013</b>	Somatosensory system	
8	Wednesday, October 16, 2013	Somatosensory system	
9	Friday, October 18, 2013	Auditory system	
Disc.	Friday, October 18, 2013	Review for Test 1	
10	<b>Monday, October 21, 2013</b>	<b>Test 1</b>	
11	Wednesday, October 23, 2013	Auditory system	
12	Friday, October 25, 2013	Auditory system	Ch 30, 31
Disc.	Friday, October 25, 2013	Dean et al. 2005	
13	<b>Monday, October 28, 2013</b>	Auditory system	
14	Wednesday, October 30, 2013	Auditory system	
15	Friday, November 01, 2013	Auditory system	
Disc.	Friday, November 01, 2013	Fritz et al. 2003	
16	<b>Monday, November 04, 2013</b>	Auditory system	
17	Wednesday, November 06, 2013	Auditory system	
18	Friday, November 08, 2013	Auditory system	
Disc.	Friday, November 08, 2013	Review for Test 2	
19	<b>Monday, November 11, 2013</b>	<b>Test 2</b>	
20	Wednesday, November 13, 2013	Visual system	Ch 25-29
21	Friday, November 15, 2013	Visual system	
Disc.	Friday, November 15, 2013	Knudsen et al. 1982; 1989	
22	<b>Monday, November 18, 2013</b>	Visual system	
23	Wednesday, November 20, 2013	Visual system	
24	Friday, November 22, 2013	Visual system	
Disc.	Friday, November 22, 2013	Jay & Sparks 1984	

25	<b>Monday, November 25, 2013</b>	Visual system	
26	Wednesday, November 27, 2013	Visual system	
	Friday, November 29, 2013	No Class - Thanksgiving	
Disc.	Friday, November 29, 2013	No Class - Thanksgiving	
27	<b>Monday, December 02, 2013</b>	Visual system	
28	Wednesday, December 04, 2013	Visual system	
29	Friday, December 06, 2013	Electrosensory system	Dr. Kip Keller
Disc.	Friday, December 06, 2013	Review for final exam	
	12/11/2013	<b>Test 3 3:15 pm</b>	

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## Journal Articles

Articles are available as PDFs on *Blackboard*.

1. Clark SA, Allard T, Jenkins WM, Merzenich MM 1988 Receptive fields in the body-surface map in adult cortex defined by temporally correlated inputs. *Nature* 332:444-445.
2. Cury KM, Uchida N 2010 Robust odor coding via inhalation-coupled transient activity in the mammalian olfactory bulb. *Neuron* 68:570–585
3. Britten KH, Shadlen MN, Newsome WT, Movshon JA 1992 The analysis of visual motion: A comparison of neuronal and psychophysical performance. *J. Neurosci.* 12: 4745-4765.
4. Dean I, Harper NS, McAlpine D 2005 Neural population coding of sound level adapts to stimulus statistics. *Nat. Neurosci* 8:1684-1689.
5. Fritz J, Shamma S, Elhilali M, Klein D 2003 Rapid task related plasticity of spectrotemporal receptive fields in primary auditory cortex. *Nat. Neurosci* 6:1216-1223.
6. Jay MF, Sparks DL 1984 Auditory receptive fields in primate superior colliculus shift with changes in eye position. *Nature* 309:345-347.
7. Knudsen EI, Knudsen PF, Esterly SD 1982 Early auditory experience modifies sound localization in barn owls. *Nature* 295:238-240
8. Knudsen EI, Knudsen PF 1989 Vision calibrates sound localization in developing owls. *J. Neurosci.* 9:3306-3313.
9. Polley DB, Chen-Bee CH, Frostig D 1999 Two directions of plasticity in the sensory deprived auditory cortex. *Neuron* 24:623-637
10. Polley DB, Kvasnak, Frostig D 2004 Naturalistic experience transforms sensory maps in the adult cortex of caged animals. *Nature* 429:67-71.
11. Salzman CD, Britten KH, Newsome WT 1990 Cortical microstimulation influences perceptual judgments of motion direction. *Nature* 346:174-177.
12. Sullivan WE, Konishi M 1984 Segregation of stimulus phase and intensity coding in the cochlear nucleus of the barn owl. *J. Neurosci.* 4:1787-1799.
13. Wang X, Merzenich MM, Sameshima, K, Jenkins WM 1995 Re-modeling of hand representation in adult cortex determined by timing of tactile stimulation. *Nature* 378:71-75.