

# Sensation and Perception (PSY 4150, CRN 44525)

Spring 2015, January 12 – May 7

Prof. Robert Carlson

## Class Information

Class Days: Mon., Wed. & Fri.

Class Time: 2:00 – 2:50

Class Location: McDonald 206

## Contact Information

Office: McDonald 222

Phone: 652-7893

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## Syllabus Disclaimer

Please note that the specifics of this Course Syllabus can be changed at any time, and you will be responsible for abiding by any such changes. These changes, if any, will be **announced in class**. If you know in advance that you will miss a class, or if an emergency arises, it is your responsibility to inform the instructor as soon as possible regarding this absence so that any necessary alternative arrangements can be made.

**Primacy of Syllabus:** If there are discrepancies (e.g., due dates, exam dates) between the syllabus and Canvas, always assume the syllabus is correct.

**Contacting Prof. Carlson:** The most effective way to contact me is by e-mail (note: sending me a message or making a comment through Canvas is **NOT** the same as e-mail—I generally won't see Canvas messages or comments). I check my DSU e-mail account regularly (rcarlson@dixie.edu), and you can generally expect an e-mail response within one academic day (a day the campus is in session). If you speak to me in person, especially away from my office, **make sure to follow up any conversations with an e-mail** to remind me to address the matter in a timely manner (I tend to forget). I may not be in my office a lot outside of office hours, but you are welcome to drop by any time to see if I have time to meet with you. If you want to be sure I will be there to talk with you during a time other than official office hours, please feel free to contact me via e-mail to make an appointment.

## Course Information:

Textbook: Goldstein, *Sensation & Perception*, 8<sup>th</sup> Edition

Office Hours: Mon., Wed., 11:00-11:50; Tue., 11:50-12:40; Fri., 10:00-11:50; and by appointment

### Outside Reading:

Baluch, F. & Itti, L. (2011). Mechanisms of top-down attention. *Trends in Neuroscience*, 34(4), 210-224. Only read through to the first paragraph on p. 218

fMRI Explanation (originally copied from the Shriver Center at the University of Massachusetts).

Optics Handout (originally prepared by Jack Yellott; modified by Prof. Carlson).

Ramachandran, V.S. & Blakeslee, S. (1998). *Phantoms in the Brain*, Chapter 2: "Knowing Where to Scratch", 21-38. Quill: NY.

## Course Description

The goal of this course is to learn about the complicated processes by which we acquire information about our environment, and to learn about the tools and methods scientists use to acquire this knowledge. Perception of visual, auditory and other sensory information has a great influence on how we interact with our environment, yet perception is often not a simple mapping between an external stimulus and our internal representations of that object. Instead, human perceptual systems are designed to modify and interpret sensory information before you are even aware of what the information is. Although there has been much progress in the study of perception over the last few decades, scientists still have a lot to learn about human perception. Our ultimate goal will be to learn enough about the current body of knowledge to make educated

speculations regarding the directions perceptual research will take, especially as this will apply to practical applications.

## The Classroom

This is a small class, so **everyone's attendance and participation** will contribute greatly toward a good learning experience. As this is a senior-level course, you are expected to **come to class prepared** by having read the appropriate reading assignment. I want you to feel free to ask questions and offer your insights into the subject matter we will be discussing each class period. If you find one topic particularly interesting, let me know so we can make sure and have a thorough discussion of that topic.

## Grading

Grading will be based on the following criteria: midterm exams (60%), a final exam (24%), weekly quizzes (10%) and brief summaries of articles (6%).

Midterms: There will be three midterm exams, each counting 20% toward your final course grade. Each exam will consist of true-false statements, multiple choice questions, diagrams and/or fill-in-the-blank statements, and, perhaps, essay questions. Midterm exams must be taken in the Testing Center during the prescribed time. Because this is a senior-level course, the exams are generally considered to be quite challenging, thoroughly testing your memory for facts and your ability to apply those facts in different formats (recall and recognition). It is very important that you keep up with your studying throughout the exam period; last-minute cramming will generally not be successful.

Final: The final exam will be an essay exam with questions provided prior to the exam. The questions will require you to integrate material learned throughout the semester. It is worth 24% of your final grade.

Quizzes: Quizzes will cover the reading assignment for a given class period and will usually be administered during the first 5 minutes of class time, but this can change. Quizzes will be given frequently, so that there will usually be either an in-class assignment or a quiz every class period. If you miss class or arrive at class after the quiz was collected, you will **not** be given an opportunity to take that quiz at a later time. No after-the-fact make-up quizzes will be offered. However, if a known conflict with a class arises, a student can arrange to take the quiz in advance. The lowest two quizzes will not count toward the final quiz average (i.e., they will be dropped).

Article Summaries: A series of articles will be assigned, and students will be expected to prepare short (2 pages **maximum**) summaries of these articles, using APA style (e.g., complete sentences, scientific writing style, etc.; no title page is required, but if one is provided it doesn't count toward the page limit). Each summary is due one week after it is assigned (the assigned date is listed on the Course Outline), with penalties of 20% per day it is late (no exceptions to this rule). Each article assignment will be written using complete sentences, demonstrating accurate use of formal scientific terminology. Include in each summary relevant background information and a general description of the main points of the article, as it relates to this course. The primary point of this assignment is to assess whether or not you can identify the main points of each article and describe those points concisely (i.e., within 2 pages). Each summary must be written **independently**. Only 3 of the 6 assigned summaries will contribute 2% each toward your final course grade (i.e., the lowest three article summary grades will be dropped).

### Articles to Summarize:

Article 1: Hubel, D. H., and Wiesel, T. N. (1959). Receptive fields of single neurons in the cat's striate cortex. *Journal of Physiology*, 148, 574-591.

Article 2: Nirenberg, S., and Pandarinath, C. (2012). Retinal prosthetic strategy with the capacity to restore normal vision. *Proceedings of the National Academy of Sciences*,

Article 3: O'Craven, K. M., Rosen, B. R., Kwong, K. K., Treisman, A., and Savoy, R. L. (1997). Voluntary attention modulates fMRI activation in human MT/MST. *Neuron*, 18, 591-598.

Article 4: Ingle, J. (1985). The goldfish as a retinex animal. *Science*, 227, 651-654.

Article 5: Graziano, M. S. A., Reiss, L. A. J., and Gross, C. G. (1999). A neuronal representation of the location of nearby sounds, *Nature*, 397, 428-430.

Article 6: Rühle, B. S., Handwerker, H. O., Lennerz, J. K. M., Ringler, R., Forster, C. (2006). Brain activation during input from mechanosensitive versus polymodal C-nociceptors. *The Journal of Neuroscience*, 26, 5492-5499.

### Make-up Exam Policy

Make-up exams are not allowed, except in the event of **extreme** and **unanticipated** circumstances. If there is a reasonable reason to believe that a situation will arise that might prevent your taking of an exam at the scheduled time (such as participation in an approved extra-curricular activity), it is your responsibility to contact the instructor **ahead of the scheduled exam time** to make separate accommodations. At least 2 days' notice is customarily expected, and more time may be required in many cases to make adequate alternative arrangements. **Make-up quizzes are never allowed.** You may, however, take quizzes in advance if there is a good reason (leaving for Thanksgiving Break two days early is **not** a good reason) why you will miss a class.

### Course Outline

<i>Date</i>	<i>Topic</i>	<i>Chapter(s):Pages</i>
Mon., Jan. 12	Welcome!	---
Wed., Jan. 14	Introduction to the Course	1:1-12
Fri., Jan. 16	Neurophysiological techniques for studying perception	2:21-28
Mon., Jan. 19	<b>Martin Luther King Jr. Day (no class)</b>	---
Wed., Jan. 21	How neurons in the eye function	2:28-42
Fri., Jan. 23	Focusing images in the eye	Optics handout
Mon., Jan. 26	The retina and color	3:43-57
Wed., Jan. 28	Lateral inhibition	3:58-68
Fri., Jan. 30	Neural organization of early vision; A.S. 1 due	4:73-82
Mon., Feb. 2	Striate cortex	4:82-89
Wed., Feb. 4	Modularity of vision	4:89-95
Fri., Feb. 6	Object perception (Gestalt principles)	5:99-107
Mon., Feb. 9	RBC and scene perception	5:108-118
Wed., Feb. 11	Perceptual inference; A.S. 2 due	5:118-127
Fri., Feb. 13	<b>Review for Midterm 1</b>	<b>Ch. 1-5, handout</b>
<b>Midterm Exam 1 in Testing Center, Feb. 13 (3:00) – Feb. 18 (1:30)</b>		
Mon., Feb. 16	<b>Presidents' Day (no class)</b>	---
Wed., Feb. 18	Attentional theories	6:133-141

## Course Outline

<i>Date</i>	<i>Topic</i>	<i>Chapter(s):Pages</i>
Fri., Feb. 20	Physiology of attention	6:141-150
Mon., Feb. 23	Using perception for navigation; A.S. 3 due	7:155-165
Wed., Feb. 25	Acting on perceptions	7:165-172
Fri., Feb. 27	What is motion?	8:177-188
Mon., Mar. 2	Perceiving motion	8:189-195
Wed., Mar. 4	Physical properties of color	9:201-206
Fri., Mar. 6	Trichromacy	9:207-213
Mar. 9-13	<b>Spring Break (no class)</b>	
Mon., Mar. 16	Opponent Processes	9:213-217
Wed., Mar. 18	Color vision in the brain	9:217-224
Fri., Mar. 20	Monocular depth cues; A.S. 4 due	10:229-235
Mon., Mar. 23	Binocular depth and size	10:235-249
Wed., Mar. 25	Size illusions	10:249-254
Fri., Mar. 27	<b>Review for Midterm</b>	<b>Chapters 6-10; handouts</b>
<b>Midterm Exam 2 in Testing Center, Mar. 27 (3:00) – Mar. 30 (1:30)</b>		
Mon., Mar. 30	Basics of sound	11:259-268
Wed., Apr. 1	Physiology of hearing	11:268-279
Fri., Apr. 3	Sound in the brain	11:280-287
Mon. Apr. 6	Localizing sound in the Ear/Brain	12:291-298
Wed., Apr. 8	Organizing Sounds in the Environment	12:298-307
Fri., Apr. 10	Speech perception; A.S. 5 due	13:311-325
Mon., Apr. 13	Cutaneous perception and plasticity	14:329-334
Wed., Apr. 15	Touch perception details	14:334-343
Fri., Apr. 17	Pain and phantom sensations; A.S. 6 due	14:343-350; Ramachandran
Mon., Apr. 20	Olfaction	15:355-366
Wed., Apr. 22	Gustation	15:366-375
Fri., Apr. 24	<b>Review for Midterm 3</b>	<b>Chapters 11-16; handout</b>
<b>Midterm Exam 3 in Testing Center, Apr. 24 (3:00) – Apr. 27 (1:30)</b>		
Mon., Apr. 27	<b>Review for Final Exam</b>	---
Wed., Apr. 29	<b>Review for Final Exam</b>	
Mon., May 4	<b>Final Exam, 12:30 – 2:30, In Class (McDonald 206)</b>	---