

Sensation and Perception

Fall 2017

(PSY 345 / NEU 325)

Time: Tues / Thurs 10-10:50am.

Location: PNI A32.

Instructor: Dr. Jonathan Pillow (pillow@princeton.edu)

Office: PNI 254 Office Hours: Tues. 11-12pm and by appt.

AI: Na Yeon Kim (nayeon.kim@princeton.edu)

Office Hours: by appt., and TBA during pre-exam and post-exam weeks: Mon. 2-4 & Fri. 10-12.

course website: <http://pillowlab.princeton.edu/teaching/sp2017/>

Course Description

This course will provide an introduction to the scientific study of sensation and perception. We tend to think of the ability to perceive the world around us as an automatic process that happens ‘for free’ whenever we use our eyes, ears, nose, and other sense organs. But sensation-and-perception is an *active* process that relies on exquisitely sensitive receptors and powerful computational machinery housed in the brain, spinal cord, and peripheral nervous system. Our perceptual capabilities have been honed by evolution over many millions of years to arrive in their current form. The central focus of this course will be to examine how these sensory systems work and why. We will undertake a detailed study of the major senses (vision, audition, touch, smell, taste), using insights and methods from a variety of disciplines (philosophy, physics, computer science, neuroscience, psychology). We will begin with a study of the physical basis for perceptual information (e.g., light, sound waves), and proceed to the biological and psychological processes by which such information is converted to percepts in the brain.

Learning Objectives

The objective of this course is to provide a thorough introduction to the biological and psychological study of the senses, and the computational and neural mechanisms that underlie sensation and perception.

Textbook

Sensation & Perception, 4th ed. Wolfe, J.M., Kluender, K.R., Levi, D.M., Bartoshuk, L.M., Herz, R.S., Klatzky, R.L., Lederman, S.J., and Merfeld, D. M.. Sinauer Associates, 2014.

The textbook has a companion website with overviews, study aides, essays on select topics, as well as some nice demonstrations of perceptual illusions we’ll discuss in class:

<http://sites.sinauer.com/wolfe4e/index.html>

Readings

Additional readings from the primary scientific literature will be assigned weekly, to be discussed during precepts. List available at: <http://pillowlab.princeton.edu/teaching/sp2017/readings.html>

Piazza:

We encourage all students to post questions to Piazza instead of sending email. This will allow others to benefit from your question, and will often result in a faster and more complete answer (since your fellow students may post answers before instructors can). Please participate on Piazza, and endorse questions and answers as you see fit. Piazza activity will count toward the 5% participation grade!

Course Piazza page: <https://piazza.com/princeton/fall2017/psy345neu325/home>

Piazza course signup link: piazza.com/princeton/fall2017/psy345neu325

Course requirements and grading

Two mid-term exams (25% each), and cumulative final exam (35%), plus active participation in precepts. Students will be expected to lead discussion of at least one scientific paper during precept and participate in discussion of jointly-presented papers (i.e. when there is no assigned presenter). Participation grade will be determined by the AI in consultation with the instructor, based on this presentation (10%) and participation (5%) in discussions led by other students.

Note also (very important!): all students must complete a *Research Participation Assignment* to receive credit for this course (see final page of syllabus).

Philosophy

Learning (like perception itself) is an active process. The more actively students engage with course materials and ideas, the more they will learn. The goal of this course is not so much to convey a set of facts as to introduce a discipline and its methods of inquiry. Our primary aims will be to dissect the ideas presented in the textbook and readings, to challenge accepted theories of perceptual phenomena, and generate new ideas and experimental hypotheses about how our percepts of the world are constructed.

Tentative schedule of topics and readings:

<u>Week</u>	<u>Lecture Topic</u>	<u>Textbook Reading</u>
(1)	Intro: Philosophy & Basic Methods	Chap. 1
(2)	Weber's law & Psychophysics Light, Optics, & Early Vision	Chap 1 Chap. 2
(3)	Retina & Receptive Fields Visual Cortex & Spatial Vision I	Chap. 2 Chap. 3
(4)	Visual Cortex & Spatial Vision II	Chap. 3

	Object Recognition	Chap. 4
(5)	Object Recognition Color I	Chap. 4 Chap. 5
(6)	Color II Exam I (Thur, Oct 19)	Chap. 5 Chap. 5
(7)	Space & Depth Perception Motion Perception I	Chap. 6 Chap. 8
(8)	Motion Perception II. Sound & Audition I	Chap. 8 Chap. 9
(9)	Sound & Audition II Auditory Perception	Chap. 9 Chap. 10
(10)	Auditory Perception II	Chap. 10
(11)	Somatosensation I Somatosensation II	Chap. 13 Chap. 13
(12)	Exam #2 (Tues, Dec 05) Olfaction (smell)	Chap. 14
(13)	Olfaction (smell) Gustation (taste)	Chap. 14 Chap. 15

Research Participation Assignment

Students in this course must complete a research participation assignment. There are two options: students may participate in psychology experiments for course credit, or may opt to complete the alternative research writing assignment.

Four hours of experimental participation are assigned to any student in this course who has not already completed 8 hours of participation for other psychology courses in the past.

Students will have access to sign up for experiments beginning on September 22, 2017, and must complete the required number of sessions by the last day of Reading Period in order to pass the course. To be clear: experimental participation must be completed satisfactorily by January 16, 2018.

Please refer to the Research Participation Assignment document posted on Blackboard for complete details and instructions.

This assignment reflects the psychology department's belief that experiencing research as a participant adds greatly to a student's understanding of course material, particularly to the student's understanding of how psychologists study behavior. Your participation not only furthers your education about the nature of psychological research; it also makes a substantial, critical contribution to psychological research at Princeton and to science in general.

As an alternative to research participation, students may complete the research writing assignment. Each paper is worth .5hrs of credit. Eight papers would be required if you choose not to participate in any experiments. Please see the Research Assignment document posted on Blackboard for further details.

All questions pertaining to this assignment should be directed to RoseMarie Stevenson (rosemari@princeton.edu).

August 2017