

**Perception and Sensory Processes**  
**Psychology W2230x**  
**Rm. 614, Schermerhorn Hall**

**Prof. Leonard Matin**  
**Fall, 2006**  
**6:10 - 7:25 Mon, Wed**

**SYLLABUS** (will be updated during the semester)

**Text:** E. B. Goldstein, *Sensation and Perception*, 7th Edition, 2007. Thomson Wadsworth (part of Thomson Corp.) available in Columbia Bookstore. The Virtual Lab Manual with CD is packaged with it; they appear to be very well done and useful.

**Additional Readings, Handouts:** to be given out during the semester. They will also be available (a) online at both e-reserve and traditional reserve; (b) as hard copy in manilla folders in a file cabinet in the Psychology Library (409 Schermerhorn; ask librarian). All Powerpoint slides shown in lecture will also be available in both media.

**Introduction:**

**Reading:** Text: Chapter 1, pp. 1-19; it provides a brief overview of the field of Perception, locates it within the fields of cognition and neuroscience, and introduces some terminology.

**Date:** (included in Wed, Sept. 6 mtg)

**Unit I: Visual Perception From the Visual Stimulus To the Back of the Eye**

**Reading:** Text, Chapt. 2, pp. 20-43, Chapt. 3, pp. 44-58 (not to the end of the chapter).

**Dates:** Wed, Sept. 6 through Mon, Sept. 25 inclusive (6 meetings).

**Topics:** (a) An elementary treatment of the stimulus for vision, psychophysical measurement, and the visual nervous system, (b) analysis of some basic perceptual phenomena (including several visual illusions) for which most of the significant optical and neural processing takes place between the incoming stimulus and the signals leaving the back of the eye (i.e., up to and including the output of the optic nerve). (c) visual thresholds, the perception of brightness, retinal receptive fields, light and dark adaptation, temporal processing, the perception of contours.

**25 MINUTE QUIZ: on Unit I (and Introduction) only.**

**First 25 minutes of class on WED, OCT 4**

**Unit II. Visual Perception from the Back of the Eye Through Visual Cortex and Beyond**

**Reading:** Text, Chapter 3, pp. 58-69; Chapter 4, 70-91.

**Dates:** Wed, Sept. 27 through Mon, Oct. 9 inclusive (4 meetings).

**Topics:** Analysis of some of the basic perceptual phenomena for which the significant neural processing takes place in visual cortex including retinotopic mapping, cortical magnification, the primary significance of the perception of lines and their orientation, spatial frequency, selective adaptation, feature detectors, specificity coding, distributed coding, grandmother cells, introduction to the two processing streams out of visual cortex, relations to cortical receptive field structure and function, first consideration of nature/nurture.

**Unit III. Perceiving Distance and Size with Monocular and Binocular Vision**

**Reading:** Text, Chapter 8, pp. 166-193.

**Dates:** Wed, Oct. 11 and Wed, Oct. 18 (3 meetings)

**Topics:** Basic binocular coding of 3-dimensional space, the special aspects of the binocular signal, stereo viewing, discrimination of depth and distance, binocular form and movement as unique phenomena, monocular movement parallax.

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**Unit IV. Perception of Color:**

**Reading:** Text, Chapter 7, pp. 140-165.

**Dates:** Mon, Oct. 23 and Wed, Oct. 25 (2 meetings)

**Topics: Part A:** laws of color mixing, trivariance and the 3 cones, why three cone types are necessary for the perception of color. **Part B:** color induction, color channels, and opponent colors in retina and higher centers.

**Unit V. Perception of Space and Motion**

**Reading:** Text, Chapter 9, pp. 194-213

**Dates:** Mon Oct. 30 (1 meeting)

**Topics:** Basics of movement perception, real and apparent movement, movement aftereffects, direction selectivity and opponent processing

**1\_ HOUR MIDTERM EXAM: WED, NOV. 1. Material covered on exam: From beginning of semester through and including Part A on Perception of Color.**

**Exam will be given on WED NOV. 1.**

**Unit VI. Perception of Objects, Space and Action, Higher Level Processing**

**Reading:** Text, Chapter 5, pp. 93-119;

**Dates:** Wed, Nov. 8 thru Wed, Nov.15 (3 meetings) [Nov. 6 holiday]

**Topics:** Two visual systems in extrastriate cortex, perception of faces, perceptual stability in the presence of eye and head movements, extraretinal signals for eye position, head position, and gravity, egocentric perception of vertical and elevation, blindsight, multimodal signals in the nervous system, control of eye movements and reaching, saccadic suppression, inflow and outflow

**Unit VII. Nature/Nurture and Perception**

**Reading:** Text, Chapter 16, pp. 351-372,

**Dates:** Mon, Nov. 20 and Wed, Nov 22 (2 meetings)

**Topics:** Specific influences of early visual exposure or deprivation on binocularity, acuity, perception of orientation; influences of correlated inputs on sensorimotor development, early need for proprioceptive feedback from fifth cranial nerve; plasticity in the brain.

**Unit VIII. Audition**

**Reading:** Text, Chapter 11, pp. 233-265; Chapter 12, pp. 266-285

**Dates:** Mon, Nov. 27 - , Mon, Dec. 4 (3 meetings).

**Topics:** dimensions of audition (pitch, loudness, timbre), dependence on cochlear mechanics, place coding and tonotopic maps in cortex, periodicity pitch, auditory localization, triplex theory, cocktail party effect, binaural unmasking.

**Unit IX. Attention, Perception, Cognition, and Sensory Interaction**

**Reading:** Text: Chapter 6, pp. 121-141

**Dates:** Wed, Dec. 6 and Mon, Dec. 11 (2 meetings)

**Topics:** Influences of criteria, attention, and short term memory

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**Exams and Grade:**

1. **Quiz:** Wed, Oct. 4. The quiz: 20 to 25 minutes. It will cover Unit I and Introduction, and be treated as approximately 10% of final grade.

2. **Midterm:** Wed, Nov. 1. This will take the full 1 1/4 hour class meeting; it will be treated as approximately 35% of final grade. It will include material covered in Units I-4Part A and Introduction.

3. **Final Exam:** 3 hour exam; Mon, Dec. 18, 7:10pm-10:00pm, Rm. 614 Schermerhorn. It will be treated as approximately 55% of final grade.

NOTE: Midterm and final exams are "cumulative".

4. **Class participation:** Questions during class are encouraged, both for clarification and to carry us deeper.

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**Addresses and Office Hours:**

Prof. Matin: rm 306, Schermerhorn Hall; 854-4538; [matin@columbia.edu](mailto:matin@columbia.edu)

Office hours to be listed later and by appointment

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