

# Psychology of Perception

Psychology 4165, Section 100

Fall 2002, Tuesday & Thursday, 09:30–10:45  
Muenzinger D-156

**Lewis O. Harvey, Jr. – Instructor**



**Hermann von Helmholtz (1821–1894)**

### Syllabus Topics and Reading Assignments

|        |                            |               |               |                             |         |
|--------|----------------------------|---------------|---------------|-----------------------------|---------|
| 27 Aug | Introduction to the Course |               | 29 Oct        | 3-D Perception              | (SB 8)  |
| 29 Aug | Psychophysics              | (SB 1)        | 31 Oct        | 3-D Perception              | (SB 8)  |
| 3 Sep  | Psychophysics              | (SB Appendix) | 5 Nov         | Action and Motion           | (SB 9)  |
| 5 Sep  | Psychophysics •1           | (SB Append)   | 7 Nov         | Action and Motion           | (SB 9)  |
| 10 Sep | The Human Eye              | (SB 2)        | 12 Nov        | Auditory System             | (SB 10) |
| 12 Sep | The Human Eye              | (SB 2)        | 14 Nov        | Auditory System •3          | (SB 10) |
| 17 Sep | The Eye & Seeing           | (SB 3)        | 19 Nov        | Hearing                     | (SB 11) |
| 19 Sep | The Eye & Seeing           | (SB 3)        | 21 Nov        | Hearing                     | (SB 11) |
| 24 Sep | Central Pathways           | (SB 4)        | 26 Nov        | Hearing •4                  | (SB 11) |
| 26 Sep | Central Pathways           | (SB 4)        | 28 Nov        | <b>Thanksgiving Holiday</b> | (SB 11) |
| 1 Oct  | Spatial Vision             | (SB 5)        | 3 Dec         | Somatosensory               | (SB 12) |
| 3 Oct  | Spatial Vision             | (SB 5)        | 5 Dec         | Taste & Smell               | (SB 13) |
| 8 Oct  | <b>Midterm Exam</b>        | (SB 5)        | 10 Dec        | Taste & Smell               | (SB 13) |
| 10 Oct | <b>Fall Break</b>          | (SB 5)        | 12 Dec        | Recapitulation              |         |
| 15 Oct | Object Perception          | (SB 6)        | <b>14 Dec</b> | <b>Saturday</b>             |         |
| 17 Oct | Object Perception          | (SB 6)        |               | <b>Final Examination</b>    |         |
|        |                            |               |               | <b>13:30–16:00</b>          |         |
| 22 Oct | Color Perception           | (SB 7)        |               |                             |         |
| 24 Oct | Color Perception •2        | (SB 7)        | 20 Dec        | Commencement                |         |

### Required Textbooks for the Course

Sekuler, R. W., & Blake, R. (2002). *Perception* (4th ed.). New York: McGraw-Hill.

Martin, D. W. (2000). *Doing Psychology Experiments* (5th ed.). Pacific Grove, California: Brooks/Cole Publishing.

**Note:** The numbers in parentheses above refer to chapters in the Sekuler and Blake (SB) and in the Martin (M) texts. Please read the indicated chapter before the class.

### Office Hours

|           |   |  |
|-----------|---|--|
| Name      | Lewis O. Harvey, Jr.  | Katherine A. Rawson  |
| Office    | MUEN D-251b   | MUEN E-213a  |
| Hours     | 11:00–12:00 M,T,W<br>By Appointment   | 10:45–11:45 T, R<br>By Appointment   |
| Telephone | 303-492-8882  |  |
| email     | <a href="mailto:lharvey@psych.colorado.edu">lharvey@psych.colorado.edu</a>            | <a href="mailto:krawson@psych.colorado.edu">krawson@psych.colorado.edu</a> |
| web       | <a href="http://psych.colorado.edu/~lharvey/">http://psych.colorado.edu/~lharvey/</a> |  |

### Laboratory Schedule

Section L101: 12:30–15:20 Tuesday MUEN D-156 ()  
Section L102: 12:30–15:20 Thursday MUEN D-156 ()

1. 3 & 5 September 2002 Begin Lab 1: **Weight Discrimination**  
(Martin Chapter 1, Chapter 12)
  2. 10 & 12 September 2002 Work on Lab 1  
(Martin Chapter 13)
  3. 17 & 19 September 2002 Lab 1 Report Due (30 points)  
Begin Lab 2: **Face Recognition**  
(Martin Chapter 12)
  4. 24 & 26 September 2002 Work on Lab 2
  5. 1 & 3 October 2002 Work on Lab 2  
Form Laboratory Groups
  6. 8 & 10 October 2002 Work on Lab 2  
Work on Group Projects
  7. 15 & 17 October 2002 Lab 2 Due (40 points)  
Begin Lab 3: **Color Naming**
  8. 22 & 24 October 2002 Work on Lab 3  
First draft of group proposal due
  9. 29 Oct & 31 Oct 2002 Lab 3 due (50 points)  
Work on Group Projects (Lab 4)
  10. 5 & 7 November 2002 Second draft of project due  
(Cover page, Introduction, References)
  11. 12 & 14 November 2002 Work on Lab 4
  12. 19 & 21 November 2002 Work on Lab 4
  13. 26 & 28 November 2002 Work on Lab 4
  14. 3 & 5 December 2002 Work on Lab 4
- 10 December 2002 Group Project **Presentations** (20 points)  
Group Project Report due (40 + 20 points)  
Each group turns in one paper with a Cover page,  
Introduction, Methods, Results and Reference  
section and each member of the group turns in their  
own discussion section. (80 points total: 40 points  
for group report, 20 points for individual discussion  
and 20 points for the group presentation).

## Conditions Under Which The Course Operates

### **Lecture:**

There will be two exams given during the semester: one mid-term and one final examination. Both are required. No make-up examinations will be given. You will receive a grade of zero for each exam not taken. Part of the semester grade will be based on homework assignments and class participation.

### **Laboratory:**

The laboratory is not optional in Psychology 4165. There will be four assignments in laboratory. These assignments will be graded and the sum of the four grades will be your laboratory grade. All lab assignments must be written and printed with a computer word processor and all graphs must be prepared with a graphics or spread sheet program.

### **Grading:**

Your final grade is computed from your exam scores, homework grades, participation grade, and the laboratory grade. The total possible points in the course is 800:

|       |                                    |
|-------|------------------------------------|
| 200   | First Examination (8 October 2002) |
| 300   | Final Exam (14 December 2002)      |
| 80    | Homework grade                     |
| 20    | Class participation                |
| 200   | Laboratory Grade                   |
| ----- |                                    |
| 800   | Total Possible Points              |

Your final letter grade in the course will be assigned in the following manner. First a "Reference Score" will be calculated by taking the mean of the top five percent of the class. Your grade will be determined by how well you have done in comparison to this reference score:

|            |           |                                  |
|------------|-----------|----------------------------------|
|            | A >96.6%, | A- >93.3% of the reference score |
| B+ >90.0%, | B >86.6%, | B- >83.3% of the reference score |
| C+ >80.0%, | C >76.6%, | C- >73.3% of the reference score |
| D+ >70.0%, | D >66.6%, | D- >63.3% of the reference score |
|            | F <63.3%  |                                  |

It is therefore possible for the entire class to receive the grade of A. By the same token, it is also possible that very few people would receive an A.

## Comments About The Psychology Of Perception

### ***Why Take This Course?***

There are three reasons to take this course: (1) **To** gain an understanding of the capabilities and limitations of our perceptual experiences; (2) **To** sharpen your ability to critically evaluate the results of experiments in light of theories of perception; and (3) **To** gain practical skills in the use of computers for designing experiments, for analyzing and graphing data, and for preparing written laboratory reports.

The study of perception is the oldest part of modern psychology. It developed from trying to answer two questions posed by philosophers: “How do we know what we know?” and “Why do things appear the way they appear?” Since most of what we know about the outside world comes to us through our sensory systems, our sensory capabilities were the first to be studied extensively. Perceptions are derived from neural and psychological mechanisms that operate on sensory information. All of our sensory systems operate under the same set of basic principles that we will study in depth:

1. **Selective Receptors:** Individual receptors respond to a restricted range of stimuli;
2. **Receptive Fields:** Individual sensory neurons respond selectively to a restricted range of stimuli that can be described by its receptive field;
3. **Distributed Response:** Each stimulus causes a pattern of activity across the neurons which respond to it;
4. **Neural Maps:** Neurons are arranged in the brain in an orderly way, forming maps based on their response properties;
5. **Columnar Organization:** Neurons that have similar response properties are organized in vertical columns of brain tissue;
6. **Parallel Pathways:** Different types of information flow from receptors to the brain in different parallel pathways;
7. **Relationship Between Physiology and Perception:** Perceptual experience is created by physiological activity—we will study this relationship in detail where possible;
8. **Cognitive Influences:** Perception is influenced by thoughts, feelings, motivations and memories.

### ***Prerequisites:***

A broad understanding of the basic concepts from a general psychology course is assumed. You will be using methods of inferential statistics, such as those taught in Psychology 101, to evaluate the results of your experiments. A facile ability with these methods in particular and with mathematical concepts through algebra and trigonometry are required. A familiarity with calculus is helpful but is not necessary. Please work through the eight questions on the next two pages. If you find these questions very difficult and you don't know how to even find out how to answer them, you probably are not ready to take this course. The course requires considerable commitment of time. For each credit hour you should expect to spend 3 hours of class-related activities (studying, research, writing) per week. Since the class is a four credit course expect to spend 12 additional hours per week outside the class and laboratory.

### Skills Needed for Psychology of Perception

**Question 1:**

Rearrange the following linear equation to solve for  $b$ :  $Y = a + b \cdot X$

$$b =$$

**Question 2:**

Solve the following equation for  $X$ :  $Y = \log X$

$$X =$$

**Question 3:**

Compute the arithmetic mean and the standard deviation of this sample of numbers:  
10.0, 9.0, 12.0, 11.0, 8.5, 13.0, 8.0, 10.0, 7.0, and 11.5:

$$\bar{X} =$$

$$s =$$

**Question 4:**

In an experiment you observe the number of times six different kinds of events occur. A theoretical model makes a prediction about how often these events should occur. These data are presented in the table below. Compute the chi-square ( $\chi^2$ ) statistic to test if the observed data are significantly different from the predicted data. You may assume  $n-1$  degrees of freedom.

|                | E1    | E2    | E3    | E4   | E5   | E6  |
|----------------|-------|-------|-------|------|------|-----|
| Observed Data  | 174.0 | 172.0 | 104.0 | 92.0 | 41.0 | 8.0 |
| Predicted Data | 175.5 | 167.8 | 106.5 | 90.4 | 44.3 | 6.5 |

$$\chi^2 =$$

**Question 5:**

In an experiment with two levels of an independent variable you observe the following values of the dependent variable for 10 subjects (five were tested under level 1 and five under level 2). Compute the mean of each column and calculate a t-test (or ANOVA if you wish) to test the hypothesis that there is a significant difference between the means:

| Level 1 |           | Level 2 |           |
|---------|-----------|---------|-----------|
| Subject | Dependent | Subject | Dependent |
| 1       | 8.0       | 6       | 10.0      |
| 2       | 9.0       | 7       | 9.5       |
| 3       | 7.5       | 8       | 11.0      |
| 4       | 7.0       | 9       | 9.0       |
| 5       | 8.5       | 10      | 10.5      |
| Mean    |           | Mean    |           |

$t(df) =$

$p =$

**Question 6:**

Convert the probability 0.76 to a z-score based on the unit, normal Gaussian distribution. What is the probability that a single sample drawn from a population having a Gaussian distribution with a mean of 0.0 and a standard deviation of 1.0 will have a value of 1.96 or greater?

**Question 7:**

Using least-squares linear regression, compute the slope ( $b$ ) and y-intercept ( $a$ ) of the straight line ( $y = a + b \cdot x$ ) that best fits the following set of data :

|     |     |     |      |      |      |
|-----|-----|-----|------|------|------|
| $x$ | 1.0 | 3.0 | 5.0  | 7.0  | 9.0  |
| $y$ | 4.1 | 9.9 | 16.1 | 22.0 | 27.9 |

$a =$

$b =$

$R^2 =$

**Question 8:**

Plot the data in Question 7 on a graph using linear axes. The x-axis should have a range of 0.0 to 10.0 and the y-axis should range from 0.0 to 30.0.

## **AGREEMENTS FOR PARTICIPATING IN THE COURSE**

The purpose of these agreements is to create a condition that allows all people in the class to get maximum value from the course.

### **AGREEMENTS**

- 1 You agree to be responsible for these agreements.
- 2 You agree to be on time to class and to your laboratory meetings.
- 3 You agree to complete the assigned reading and homework on time.
- 4 You agree to complete your laboratory assignments on time.
- 5 You agree to attend all class and laboratory meetings unless an emergency comes up.
- 6 You agree to understand the material.
- 7 You agree to ask questions when you don't understand the material.
- 8 You agree to communicate any complaints and criticisms you may have only to someone who can do something about the situation and you agree not to complain or to criticize to someone who cannot do something about the situation.
- 9 You agree to get value out of your participation in the course.

If you attend the next class meeting, you are accepting responsibility for the above agreements.