Psychology of Perception

Psychology 4165, Section 100

Spring 2011, Tuesday and Thursday, 9:30–10:45
Muenzinger D-156

Lewis O. Harvey, Jr. – Instructor

THE WORLD OF THE EXTERNAL OBSERVER BY ERNST
MACH (AUSTRIA), DRAWING IN HIS BOOK 'ANALYSE DER
EMPFINDUNG' PUBLISHED IN 1906.

Ernst Mach (1838–1916)

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Syllabus Topics and Reading Assignments

11 Jan	Psychophysics	(C 1)	15 Mar	Retinal Processing	(C 9)
13 Jan	Psychophysics •1	(C 1)	17 Mar	Retinal Processing	(C 9)
18 Jan	Biological Foundations	(C 2)	22 Mar	**Spring Break**	
20 Jan	Biological Foundations	(C 2)	24 Mar	**Spring Break**	
25 Jan	Somatosensory System	(C 3)	29 Mar	Cortical Processing	(C 10)
27 Jan	Somatosensory System •2	(C 3)	31 Mar	Cortical Processing •5	(C 10)
1 Feb	Chemosensory System	(C 4)	5 Apr	Color Perception	(C 11)
3 Feb	Chemosensory System •3	(C 4)	7 Apr	Color Perception •6	(C 11)
8 Feb	Sound and the Ear	(C 5)	12 Apr	Depth Perception	(C 12)
10 Feb	Sound and the Ear	(C 5)	14 Apr	Depth Perception •7	(C 12)
15 Feb	Hearing	(C 6)	19 Apr	Motion and Action	(C 13)
17 Feb	Hearing •4	(C 6)	21 Apr	Motion and Action •8	(C 13)
22 Feb	Music and Speech	(C 7)	26 Apr	Attention	
24 Feb	Music and Speech	(C 7)	28 Apr	Recapitulation	
1 Mar	Music and Speech	(C 7)	4 May	**Final Exam**	
3 Mar	**Review**			**Wednesday (16:30–19:00)**	
8 Mar	**First Examination**				
10 Mar	Light, Optics and the Eye	(C 8)			

Required Textbooks for the Course

Chaudhuri, A. (2010). *Fundamentals of Sensory Perception*. New York: Oxford University Press.
www.oupcanada.com/Chaudhuri

Martin, D. W. (2007). *Doing Psychology Experiments* (7th ed.). Pacific Grove, California:
Brooks/Cole Publishing. (Optional)

Note: The numbers in parentheses above refer to chapters in the Chaudhuri (C) text. Please read
the indicated chapter before the class meeting.

Office Hours

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Psychology of Perception
Psychology 4165-100
Spring 2011

Lewis O. Harvey, Jr.–Instructor
Clare E. Sims–Assistant
09:30–9:45 TuTh

Supplemental Reading

1.	11 & 13 Jan 2011	(Stevens, 1961)
2.	18 & 20 Jan 2011	(Wager et al., 2004)
3.	25 & 27 Jan 2011	(Ramachandran & Hirstein, 1998)
4.	1 & 3 Feb 2011	(Borg, Diamant, Ström, & Zotterman, 1967)
5.	8 & 10 Feb 2011	(Winer & Lee, 2007)
6.	15 & 17 Feb 2011	(Zwicker, Flottorp, & Stevens, 1957)
7.	22 & 24 Feb 2011	(MacDonald & McGurk, 1978)
8.	1 & 3 Mar 2011	**Mid-Term Exam**
9.	8 & 10 Mar 2011	(Leibowitz & Owens, 1975)
10.	15 & 17 Mar 2011	(Schiller & Carvey, 2005)
11.	22 & 24 Mar 2011	**Spring Break**
12.	29 & 31 Mar 2011	(Kanwisher & Yovel, 2006)
13.	5 & 7 April 2011	(Jacobs & Nathans, 2009)
14.	12 & 14 April 2011	(Kaufman & Rock, 1962a, 1962b)
15.	19 & 21 April 2011	(Chatterjee, Freyd, & Shiffrar, 1996)
16.	26 & 28 April 2011	(Most & Astur, 2007)

Copies of these papers will be available to download for reading. See the reference section at the end of the syllabus for complete citation information.

Laboratory Schedule

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

1.	11 & 13 Jan 2011	**Introduction to R**
2.	18 & 20 Jan 2011	Lab 1 data collection: **Noisy Representations** (Martin Chapter 1, Chapter 12)
3.	25 & 27 Jan 2011	Lab 1 data analyses (Martin Chapter 13)
4.	1 & 3 Feb 2011	Lab 2 data collection: **Signal Detection** **Lab 1 Report Due** (30 points)
5.	8 & 10 Feb 2011	Lab 2 data analyses
6.	15 & 17 Feb 2011	Lab 3 data collection: **Color Naming** **Lab 2 Report Due** (40 points)
7.	22 & 24 Feb 2011	Lab 3 data analysis **Form Research Project Teams** (Martin Chapters 6 & 7)
8.	1 & 3 Mar 2011	**Lab 3 Report Due (50 points)** Work on Group Projects **First draft of project proposal due** (Cover Page, Introduction, References)
9.	8 & 10 Mar 2011	Work on Group Projects **Second draft of project proposal due** (Cover Page, Introduction, Methods, Expected Results, References)
10.	15 & 17 Mar 2011	Work on Group Projects Data Collection
11.	22 & 24 Mar 2011	**Spring Break**
12.	29 & 31 Mar 2011	Work on Group Projects: Data Collection and Analysis
13.	5 & 7 April 2011	Work on Project Presentations
14.	12 & 14 April 2011	Work on Project Presentations
15.	19 & 21 April 2011	**Group Project Presentations: Both lab groups meet on** **Thursday, April 21, 12:30–15:20** (20 points)
16.	26 & 28 April 2011 27 April 2011 (Wednesday) 28 April 2011 (Thursday)	No regular lab meetings this week **Undergraduate Research Day, Glenn Miller Ballroom, 15:00–17:00** **Final Project Reports Due in Class** (40 + 20 points)

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. There will be eight computational homework assignments. Each homework will be handed out on a Thursday (marked by bullets on the syllabus) and will be due the following week.

Laboratory:

The laboratory is not optional in PSYC 4165. There are four assignments in the 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 using computer graphics.

Grading:

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

200	First Examination (8 March 2011)
300	Final Examination (4 May 2011)
200	Laboratory Grade
80	Homework Grade
20	Participation 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 three scores 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, depending on the spread of grades across the class.

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;

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. We will study the limits of our sensory and perceptual abilities and learn how to characterize the unreliability that results from these limits.

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 3101, 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 even know how to find out how to answer them, you probably are not ready to take this course.

You will need to make a 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*: $y = a + bx$

    $b =$

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:

    $\mu =$

    $\sigma =$

Question 4:
In an experiment you observe the number of times six different kinds of events occur. A theoretical model makes predictions about how often these events *should* occur. These data are presented in the table below. Compute the chi-square (χ^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

Subject	Dependent
1	8.0
2	9.0
3	7.5
4	7.0
5	8.5
Mean	

Level 2

Subject	Dependent
6	10.0
7	9.5
8	11.0
9	9.0
10	10.5
Mean	

$t(df) =$

$p =$

Question 6:
Convert the probability 0.8413447 to a quantile score based on the cumulative distribution function (CDF) of the unit normal Gaussian distribution (a quantile is a z-score). Such a transformation is achieved by the quantile function (`q <- qnorm(p)` in R, where p is the probability). 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 1.959964 or greater (use `pnorm(q)` in R)?

$q =$

$p =$

Question 7:
Using least-squares linear regression, compute the slope (a) and y-intercept (b) of the straight line, $y = a + bx$, that best fits this set of data. Use `lm(y ~ 1 + x)` in R:

x	1.0	3.0	5.0	7.0	9.0
y	0.98	8.73	17.0	20.9	27.4

$a =$

$b =$

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. Use the plot() function in R.

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.

Academic Integrity Policy

A university's intellectual reputation depends on maintaining the highest standards of intellectual honesty. Commitment to those standards is a responsibility of every student, faculty, and staff member on the University of Colorado at Boulder campus.

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Honor Code

A student-run Honor Code was instituted on the Boulder Campus in 2002. The intent of the Honor Code is to establish a community of trust where students do not plagiarize, cheat, or obtain unauthorized academic materials. An honor code council collaborates with the colleges and schools in addressing allegations and instances of academic dishonesty and in assisting to educate all members of the university community on academic integrity issues.

Breaches of academic honesty include cheating, plagiarism, and the unauthorized possession of examinations, papers, computer programs, as well as other class materials specifically released by the faculty.

A student accused of academic dishonesty will either accept the accusation made by a faculty member or request a hearing before a student panel, who will make a decision on the accusation of academic dishonesty. In addition to academic sanctions imposed by the faculty, students found guilty of academic dishonesty also face consequences from the honor code council ranging from attending a mandatory class in ethics to expulsion from the campus. More information about CU-Boulder's Honor Code may be found at www.colorado.edu/academics/honorcode/Home.html.

The following terms are clarified for the benefit of all members of the university community.

Cheating

Cheating is defined as using unauthorized materials or receiving unauthorized assistance during an examination or other academic exercise. Examples of cheating include: copying the work of another student during an examination or other academic exercise (includes computer programming), or permitting another student to copy one's work; taking an examination for another student or allowing another student to take one's examination; possessing unauthorized notes, study sheets, examinations, or other materials during an examination or other academic exercise; collaborating with another student during an academic exercise without the instructor's consent; and/or falsifying examination results.

Plagiarism

Plagiarism is defined as the use of another's ideas or words without appropriate acknowledgment. Examples of plagiarism include: failing to use quotation marks when directly quoting from a source; failing to document distinctive ideas from a source; fabricating or inventing sources; and copying information from computer-based sources, i.e., the Internet.

Unauthorized Possession or Disposition of Academic Materials

Unauthorized possession or disposition of academic materials may include: selling or purchasing examinations, papers, reports or other academic work; taking another student's academic work without permission; possessing examinations, papers, reports, or other assignments not released by an instructor; and/or submitting the same paper for multiple classes without advance instructor authorization and approval.

Reproduced from: http://www.colorado.edu/policies/acadinteg.html

Statements Recommended by

Associate Vice Chancellor for Undergraduate Education, Michael Grant

1. *Recommended syllabus statement on disabilities*: If you qualify for accommodations because of a disability, please submit a letter to me from Disability Services in a timely manner so that your needs may be addressed. Disability Services determines accommodations based on documented disabilities. Contact: 303-492-8671, Willard 322, or
   http://www.Colorado.EDU/disabilityservices/

2. *Recommended syllabus statement on religious observances*: Campus policy regarding religious observances requires that faculty make every effort to reasonably and fairly deal with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. Please speak with me if you have a conflict. See policy details at

   http://www.colorado.edu/policies/fac_relig.html/

3. *Recommended syllabus statement on classroom behavior*: Students and faculty each have responsibility for maintaining an appropriate learning environment. Students who fail to adhere to behavioral standards may be subject to discipline. Faculty have the professional responsibility to treat students with understanding, dignity and respect, to guide classroom discussion and to set reasonable limits on the manner in which students express opinions. See policies at

   http://www.colorado.edu/policies/classbehavior.html/ and at
   http://www.colorado.edu/studentaffairs/judicialaffairs/code.html#student_code/

4. *Recommended syllabus statement on the Honor Code*: All students of the University of Colorado at Boulder are responsible for knowing and adhering to the academic integrity policy of this institution. Violations of this policy may include: cheating, plagiarism, aid of academic dishonesty, fabrication, lying, bribery, and threatening behavior. All incidents of academic misconduct shall be reported to the Honor Code Council (honor@colorado.edu; 303-725-2273). Students who are found to be in violation of the academic integrity policy will be subject to both academic sanctions from the faculty member and non-academic sanctions (including but not limited to university probation, suspension, or expulsion). Additional information on the Honor Code can be found at

   http://www.colorado.edu/policies/honor.html/ and at
   http://www.colorado.edu/academics/honorcode/

References

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