

# Introductory Statistics for Behavioral Scientists

Psych 1610  
Fall 2007

Prof. Tor D. Wager  
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Tuesdays and Thursdays (TR) 2:40 - 3:55  
614 Schermerhorn

Course website:  
<http://courseworks.columbia.edu>

Lab Website:  
<http://www.columbia.edu/cu/psychology/tor/>

Office hours:  
Wed, 3-4 pm, or by appointment.

Teaching Assistants  
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## Course Overview

This course is designed to provide an introduction to basic concepts in statistics and probability, and to get you up and running as quickly as possible analyzing real data and understanding the results. Emphasis is on understanding intuitions behind statistical principles and in applications to data. The first half of the course focuses on the building blocks of statistical inference: descriptive statistics, distributions, basic regression, and probability. The second half of the course applies this knowledge to statistical tests. We cover the sampling distribution, p-values, and basic power analysis, and we show how to conduct hypothesis tests using t-tests, simple linear regression, chi-square tests, and ANOVA, and we talk briefly about multiple regression. Throughout, the course emphasizes examples from psychology and the social sciences.

Computer labs will be held once a week, in which students will learn to apply concepts learned in class to data sets using Excel

and SPSS.

## Office Hours

Office Hours will be Wed at 3 pm. I am usually available before and after class. My office is in 369 Schermerhorn Hall. My office phone number is 212-854-5318, but the best way to reach me is by email: [tor@psych.columbia.edu](mailto:tor@psych.columbia.edu)

## Readings

The textbook for this course is:

De Veaux, Velleman, and Bock (2007). ***Stats: Data and Models***. Boston : Pearson/Addison Wesley. 2<sup>nd</sup> Edition.

It should be available at the CU bookstore (Barnes and Noble on 115<sup>th</sup> and Broadway). You may also be able to purchase it used from on-line booksellers. Outside readings will be available through on-line reserve or will be distributed in class.

## Assignments and grading

Labs and Homework: 40% (20% class 'homework, 20% lab participation/lab assignments)

Sets of homework problems will be assigned on Thursday; each is due the class period following assignment (Tuesday). Lab assignments will also be given. Homework assignments will be graded on a 10-point scale. Show your work: Emphasis is on getting the right steps and making the right decisions. Because the primary purpose of the homework is to help you stay abreast of topics as we cover them, each homework must be turned in no

later than the *beginning* of the class when it is due. Late homeworks will be deducted one point per day.

Labs are designed to give you hands-on experience with statistical packages and data analysis (SPSS and Excel), and they are an integral part of the course. Lab assignments will be given each period, generally to be completed during the lab session, although you may take them home and finish them by the start of the next lab period. Lab assignments will be graded on a 0 - 2 point scale, with 1 point deducted for each day late.

You are encouraged to form study groups. Working together on homework is a good idea; copying is not. The work you turn in should indicate your own ability to solve the problems. In the second half of the semester, you may work on homework problems in groups of 3-4 and turn in a group report.

Tests: 60%

There are two tests, a midterm and a final. The midterm is worth 20% of your total grade, and the final is worth 30%. The final will be cumulative. Questions may come from the lectures, the labs, or the text. Bring your calculator and one page with whatever you like written on it (formulas, etc.). If you know that you will be absent on either of these days, please speak to me as soon as possible. Otherwise, if you miss a test because you are sick or for some other non-trivial reason, please notify me as soon afterward as possible and arrange to take a make-up test. You will be asked to bring a note from a physician or a dean.

## **Class project**

The last assignment for the course is an individual (or pair) project, worth 10% of your total grade. "Pair" means that you have the option to do this assignment with a partner (but in this case your project should reflect two people's worth of work.)

If you want extra credit and feel like you're not testing up to your

potential, do well on this assignment. There is no other extra-credit option, because giving extra credit work to some and not others is not fair to all students.

The assignment is to collect data on yourself that is interesting and meaningful for you. You should collect data that will allow you to investigate several (not just one) interesting relationships between variables you observe concerning yourself and/or the world. For example, you might record your body weight, your waking time, and your roommate's opinion of your mood each day before and after going on an all-sushi diet. (Just an example, don't actually eat only sushi). You will prepare a full report of your data and what you found.

### Schedule

DATE	DAY	TOPIC	ASSIGNMENT	LECTURE
9/4	Tu	Introduction to Statistics Fallibility of Everyday Statistical Reasoning	Read Chapters 1 & 2 HW #1	Lecture 1
9/6	Thurs	Data and distributions: Organize and Visualize	Read Chapters 3 & 4	Lecture 2
9/11	Tu	Descriptive statistics: Mean, median, mode, standard deviation	Read Chapter 5; HW #1 due	Lecture 3
9/13	Thurs	The normal distribution and Z-scores: First steps toward inference Visualizing distributions and sampling distributions	Read Chapter 6; HW #2  Jan 26: Last Day to Add Class	Lecture 4
9/18	Tu	Relationships between variables: Scatterplots and correlation. sampling distribution	Read Chapter 7; HW # 2 due	Lecture 5

9/20	Thurs	Linear Regression I: The basics	Read Chapter 8; HW #3	Lecture 6
9/25	Tu	Regression Wisdom	Read Chapter 9; HW #3 due	Lecture 7
9/27	Thurs	Transformation of variables	Ch. 10; HW #4	Lecture 8
10/2	Tu	Review Parts I and II	HW #4 due	Lecture 9
10/4	Thurs	Randomness and sampling	Read Chapter 11 & 12; HW #5	Lecture 10
10/9	Tu	Intro to probability	Ch. 14; HW #5 due  Last Day to Drop Class	Lecture 11
10/11	Thurs	Probability	Read Chapter 15; HW #6	Lecture 12
10/16	Tu	Random variables	Read Chapter 16; HW #6 due	Lecture 13
10/18	Thurs	Probability distributions	Read Chapter 17;	Lecture 14
10/23	Tu	Midterm Review		--
10/25	Thurs	MIDTERM EXAM		
10/30		HOLIDAY		
11/1	Tu	The sampling distribution	Read Chapter 18;	Lecture 15
11/6	Thurs	Confidence intervals for proportions, Hypothesis tests for proportions	Read Chapter 19 & 20	Lecture 16
11/8	Tu	Hypotheses tests: power, false positives	Read Chapter 21; HW #7 Last Day to Pass/Fail	Lecture 17
11/13	Thurs	Test of a difference between two proportions	Read Chapter 22; HW #7 due	Lecture 18
11/15	Tu	Confidence intervals and hypothesis tests for means; One-	Read Chapter 23; HW #8	Lecture 19

		sample t-test; Basic power analysis		
11/20	Thurs	Comparing means for two samples; Two-sample t-test; Mann-Whitney U	Read Chapter 24; HW #8 due	Lecture 20
11/22		HOLIDAY		
11/27	Tu	Comparing means for paired samples paired t-test (simplest repeated measures)	Read Chapter 25; HW #9	Lecture 21
11/29	Thurs	Regression Inference ANOVA	Read Chapter 27 and 28; HW #9 due	Lecture 22
12/4	Tu	Class presentations	Review chapters	Lecture 25
12/6	Thurs	Class presentations	LAST CLASS!	
12/10-12/14		STUDY DAYS		
DATE and TIME?? (not posted yet)		FINAL EXAM		