Statistics 7 – Basic Statistics

When: MWF 11:00am-11:50am
Where: MSTB 118 (building 415 on campus map)
Discussions: W 12:00-12:50pm in ICS 180 (building 302)
  F 12:00-12:50pm in ICS 180 (building 302)

Instructor: Professor Hal Stern
 Department of Statistics
 2216 Bren Hall (a.k.a. ICS 3, building 314 on map)
 Ph: 949-824-1568
 Email: sternh@uci.edu
 Course web: www.ics.uci.edu/~sternh/courses/7
 Office hours: Thursday 1:30-2:30pm (also available by appointment .. just email!)

Teaching Assistant: Kameryn Denaro, 2219 Bren Hall, kdenaro@uci.edu, Office hours: W 2:30-3:30

Course goals: To develop an understanding of the basic concepts of probability and statistics. To help students to be informed and critical readers of quantitative arguments/articles. To provide sufficient skills to enable students to apply basic statistical techniques. Topics covered during the quarter include exploratory data analysis (graphical and numerical data summaries), data collection, probability and sampling distributions, statistical inference (confidence intervals and tests for a variety of situations).

Prerequisites: Only high school level knowledge of elementary algebraic notation is assumed.

Sections: Attendance at weekly discussion sections is strongly recommended. Both sections are open to all students and cover essentially the same material. During the discussion section you will be given feedback on previous homeworks and exams; you have the opportunity to ask questions about the course material and current homework; and occasional new material will be presented.
The first week only sections will meet in ICS 192 (computer lab). The TA will be available to help you learn the basics of Stata. My office hour (Thursday 1:30-2:30 will also be in ICS 192 this first week). Stata is described in more detail below – please read that section carefully as some action is required on your part!

Textbook: *The Basic Practice of Statistics* by David S. Moore (W H Freeman, 4th edition, 2005). The text is on sale at the UCI Bookstore and at your favorite bookselling website! Note that previous editions are probably OK but the chapter numbers and problems will vary – you will have to solve this problem if you opt for a different edition.

Other references that may be useful if you are having difficulty with the required text include:
Statistics by D. Freedman, R. Pisani, R. Purves (W W Norton, 4th edition, 2007)
Stats: Data and Models by R. De Veaux, P. Velleman, D. Bock (Pearson/Addison-Wesley, 2nd edition, 2007)

Homework: There will be weekly homework. (Sorry but it is the best way to learn the material!) Assignments will be handed out on Fridays and typically due the following week. You may discuss problems with other students, the TA, or the instructor but you should write them up independently (and neatly). You should also show your work so that we can help identify problem areas.

The official course policy is that **no late homework will be accepted.** In cases with extenuating circumstances your teaching assistant may agree to accept late work. If this is not arranged, then your assignment will receive a grade of zero.

Computer Work: Statistical work is almost always done using a computer package these days. In this course you will get experience using **Stata.** No prior computing experience is needed. You will be taught everything that you need to know. Stata is simple to learn but is powerful enough to use on real projects later on in your academic (or real) life. Stata is available in the ICS computer labs (rooms 183, 189, 192, and 364 in ICS I). To use Stata in the ICS labs you need to have an account with ICS computing. To get an account you must visit the lab in room 364 and talk to the lab manager. The lab manager will want to see your UCI ID card and will have you complete an online "Ethics of Computing" questionnaire. (It will then take about 2 hours for your account to activate – but may take longer so don't wait for the last minute.) You can purchase Stata for your computer if you would prefer to avoid the "lab experience" (a student version costs $48 … see licenses.nacs.uci.edu and search for Stata).

Resources: You can learn more about Stata from the book *Statistics with Stata* by Lawrence Hamilton (but this is not required). You can also learn from resources at the UCLA Academic Technology Services website (www.ats.ucla.edu/stat/stata).

A key point for the quarter – do not hand in piles of computer paper with your homework. You need to cut and paste either figuratively (using your computer) or literally (with scissors and tape).

Grading and Course Requirements: Students will be assigned weekly problem sets (handed out Friday and due the following Friday). There will also be a short project (see below). There will be two mid-term exams (Wednesday April 23 and Wednesday May 21) and final exam (Tuesday, June 10, 1:30-3:30pm). Course grades are determined by performance on this work as follows: homework/project (25%), midterm exams (40% total), and final exam (35%).

Project: The project is intended to expose you to the use of statistics in real problems. It will be assigned formally approximately mid-way through the course. You may do the project alone or you may work in groups of 2-4 students. Ideally projects will involve the collection and analysis of a small data set (some examples will be discussed at an appropriate time). Alternative ideas include a critical discussion of an article applying statistical methods to a subject of interest to you or a discussion of a more advanced statistical topic. The final produce will be a short (emphasis on short) report (2-5 pages).

Tentative Syllabus

Weeks 1 & 2 – Describing Data (6 lectures): Graphical displays of data and numerical summaries. Specific topics include: histograms, stemplots, time series plots, scatterplots, mean/median/mode, standard deviation, percentiles, regression and correlation, tables. (Reading: Chapters 1-2, 4-6)

Week 3 – Gathering Data (3 lectures): Sampling and surveys, experiments, observational studies. (Reading: Chapters 8-9)

First midterm is Wed April 23 – it covers material in Weeks 1-3

Weeks 4 & 5 – Probability, Random Variables and Sampling Distributions (6 lectures): Introduction to basic ideas in probability. Use of probability to describe the distributions of random variables. The key idea of repeated sampling from a population.
(Reading: Chapters 3, 10-13).

Week 6 – Introduction to Statistical Inference (3 lectures): Confidence intervals and statistical tests are introduced in a sample case (normal data with known variance). (Reading: Chapters 14-16)

Week 7 – Statistical Analysis with One Sample (3 lectures): Statistical inference procedures for a population mean and a population proportion. (Reading: Chapters 18, 20)

Second midterm is Wed May 21 – it covers material in Weeks 1-7 but naturally emphasizes Week 4-7.

Weeks 8 & 9 – Statistical Analysis with Two or More Samples (3 lectures): Statistical inference procedures for comparing two or more population means (or proportions time permitting). (Reading: Chapters 19, 25 (and maybe 20, 23))

Week 10 – Statistical Analysis for Linear Regression (2 lecture): Return to linear regression (introduced earlier as a descriptive technique) to see how statistical inference can be used in that setting. (Reading: Chapter 24)