Contact info: Professor Hal Stern
   Department of Statistics
   2216 Bren Hall ZOT 1250
   email: sternh@uci.edu
   phone: 949-824-1568
   website: www.ics.uci.edu/~sternh/courses/210/

Class hours
   Lecture: TuTh 9:30am-10:50am DBH 1300
   Discussion: W 1:00pm - 1:50pm DBH 1300

Office hours: W 2:00pm - 3:00pm (and by appointment)

Course goals: Introduction to statistical methods for analyzing data from experiments, observational studies and surveys. Methods covered include two-sample procedures, analysis of variance, linear regression. Course covers both the underlying theory behind these methods and how the methods are applied in practice.

Prerequisites: Knowledge of basic statistical methods (at the level of Statistics 7), knowledge of undergraduate probability and statistics (at the level of Statistics 120ABC), calculus, linear algebra.

Course outline/schedule (tentative)

Th Sept 27 - Th Oct 4 (3 lectures): Introduction to inference / Inference in the two-sample case
Randomization-based and model-based approaches to two-sample inference including discussion of study design and model checking.
(Reading: Chapter 15, Appendix A.6-7)

T Oct 9 - Th Oct 18 (4 lectures): Analysis of variance (ANOVA)
One-way analysis of variance for inference concerning more than two samples/populations including discussion of planned contrasts and multiple comparisons. Use of pairing/blocking to reduce variance.
(Reading: Chapters 16-18, 21)

T Oct 23 - Th Oct 25 (2 lectures): Simple linear regression and correlation
(Reading: Chapters 1-5)

T Oct 30 - Th Nov 8 (3 lectures): Multiple linear regression: basics
(Reading: Chapters 6-7)

T Nov 6 - MIDTERM EXAM

T Nov 13 - TNov 27 (4 lectures) - Multiple regression: model diagnostics/remedies and model building
Evaluating regression assumptions and potential remedies; study of outlying and influential cases; model building strategies.
(Reading: Chapters 8-12)

Th Nov 22 - NO CLASS (holiday)

Th Nov 29 (1 lectures) - Relationship of ANOVA and regression
(Reading: Chapters 22)

T Dec 4 - Th Dec 6 (2 lectures) - Factorial experiments and ANOVA, makeup/review topics
(Reading: Chapters 19-20, 23-24)
Discussion: There is a discussion section associated with this class on Wednesdays at 1pm. This discussion serves several purposes: (1) It is an ideal time to ask questions about class/homework; (2) It is an ideal time for R/RStudio instruction/discussion; (3) It can be used as needed for me to present additional material or make up for a missed lecture. You are not required to attend discussion UNLESS I ask you to attend on a given week. Attendance is highly recommended in any case – if you do come, please bring your questions!

Exams: There will be an in-class midterm exam. This is scheduled for Tuesday November 6, 2018. The final exam will consist of two elements: (1) Take-home data analysis; (2) Standard two-hour final exam. The latter will occur on Thursday December 13, 2018 from 8:00-10:00am.

Homework: Students will be assigned (approximately) weekly homework. Homework will be generally due on Thursdays. These assignments will include some application-oriented questions and some theory questions. The homework will also require the use of the R software package to analyze data. You are allowed to discuss homework with other students and with me. Every student must write-up the homework independently. Failure to complete your homework independently will be punished – students who turn in the same work will split the grade! Late homework will be penalized but it is much better to turn homework in late than not at all; homework turned in after solutions have been posted will not earn any credit.

R / RStudio: You are expected to use R (and/or the RStudio environment) for data analyses. Please download R and RStudio. A document with detailed instructions is available at the course website.

Grading: Course grades are determined by performance on all work as follows: homework (approx 25%), midterm exam (approx 30%), final exam (approx 45%).

Textbooks and References:

Note: The book is out-of-print so is not available at the bookstore. You can either buy a used copy via Amazon or other website or purchase an Ebook comprised of the relevant chapters for our course from https://create.mheducation.com/shop/ (best to search for the eBook with its ISBN 9781307330694).


References (intro stat):

References (prob and stat):