Course Information

Course: Advanced Statistical Methods, PSTAT 220A, Fall 2009.

Instructor: Yuedong Wang, South Hall, Room 5509. Phone: 893-4870. E-mail: yuedong@pstat.ucsb.edu. Web: http://www.pstat.ucsb.edu/faculty/yuedong

TA: ?, ?@pstat.ucsb.edu

Time: TR 11:00 - 12:15

Place: Phelp 3519

Office hour: TR 2:00 - 3:00, or by prior appointment

Purpose of this class: This is the first quarter of the one year graduate course 220ABC on *applied* statistical methods. The aim is to develop analytical skill for the statistical analysis of data, with emphasis on the basis for the methods, the implementation of the methods, and report writing. We will be using R and SAS throughout the year to demonstrate how these methods work.

Topics: Descriptive statistics, numerical and graphical data summaries, statistical models, basic design and tests, linear model, regression, experimental design, ANOVA.

Reading: Reading will be assigned in lectures. You are responsible for the material contained in the readings, even if not discussed in class.

Prerequisites: Pstat 120ABC, or consent of instructor.

Reference:

VR Venables, W. N. and Ripley, B. D. (2002), *Modern Applied Statistics with S*, 4th ed, Springer.

JF Faraway, J. J. (2005), *Linear Models with R*, Chapman & Hall.

SE Seber, G. A. F. (1977), *Linear Regression Analysis*, Wiley.

DS Draper, N. R. and Smith, H. (1998), *Applied Regression Analysis*, 3rd ed, Wiley.

YA Yandell, B. S. (1997), *Practical Data Analysis for Designed Experiments*, Chapman and Hall.

AG Agresti, A. (1984), *Analysis of Ordinal Categorical Data*, Wiley.

MJ Milliken, G. A., Johnson. D. E. (1984), *Analysis of messy data*, Lifetime Learning.

Course Grading: Homework, projects, mid-quarter test, final exam.

PSTAT 220AB Outline

A R (VR ch1-ch4, JF Appendix B), SAS

A Summary statistics (VR ch5)

- numerical: mean, median, quantile, variance etc.
- graphical: histogram, boxplot, QQ-plot, kernel density, etc.

A basic tests: t, F, Wilcoxon, chi-squared (AG ch1-ch4), permutation, bootstrap (VR ch5)

A Statistical models

A Linear models (SE ch3-ch6, VR ch6, YA ch12)

- regression (SE ch7-ch8)
- ANOVA (SE ch9, YA Part A - Part E, BH)
- ANCOVA (SE ch10, YA Part F)

A Linear mixed models: random effects, mixed effects, split-plot, repeated measures (VR ch10, YA Part G - Part H)

B Generalized linear models including log-linear models (VR ch7)

B Nonlinear regression models, general optimization and MLE (VR ch10, BW)