STAT 672 Spring 2011
Nonparametric Statistics Professor Bailey

Syllabus

Course Web Page: `http://rohan.sdsu.edu/~babailey/stat672`
and `blackboard.sdsu.edu`

Meeting Time: Lectures: TTh 4:00 - 5:15 p.m. in GMCS 308

Instructor: Professor Barbara Bailey
GMCS 513
email: babailey@sciences.sdsu.edu
Office Hours: Tu 12:30 - 2:00 p.m., Th 2:30 - 4:00 p.m; by appointment

Reference: The textbook for the course is

Hollander, M. and Wolfe, D. A. (1999). *Nonparametric Statistical Methods*, 2nd Edition. John Wiley & Sons, Inc.

Catalog Description: Theory and application of commonly used distribution-free test statistics, including sign and Wilcoxon tests, and corresponding nonparametric point and interval estimators. Kruskal-Wallis and Friedman tests for analysis of variance, nonparametric regression methods, and other selected topics.

Objectives: Nonparametric statistical methods combine the theory and application of commonly used distribution-free test statistics, density and function estimation methods. Analysis of data from problems in many fields such as agricultural science, biology, education, engineering environmental science, medicine, physics, and psychology are some important examples. This course will provide you with the basic theory and computing tools to perform nonparametric tests including the sign test, Wilcoxon signed rank test, and Wilcoxon rank sum test, as well as the corresponding nonparametric point and interval estimation. Kruskal-Wallis and Friedman tests for one-way and two-way analysis of variance, multiple comparisons, dispersion and independence problems are other nonparametric tests covered. Other topics include estimation methods for nonparametric density, regression, and computing as they relate to nonparametric statistics and bootstrapping.

Learning Outcomes:

- Summarize data using both graphical and numerical methods for use in nonparametric statistical methods.
- Formulate, test and interpret various hypothesis tests for location, scale, and independence problems.
- Use statistical methods, including nonparametric bootstrapping, to construct and interpret interval estimators for population medians and other population parameters based on rank-based methods.
- Characterize, compare, and contrast different nonparametric hypothesis tests.
- Produce and interpret statistics and graphs, using nonparametric density estimation and nonparametric function estimation techniques.
- Present and communicate, both orally and in written-form, the results of statistical analyses of nonparametric data.

Homework: Homework assignments will be regularly available on the course web page as announced in class. The homework will contain a series of practice problems of which *selected problems* **will** be graded. The homework serves as a tool to review and practice the material covered in class. All material covered on the assignments can be questioned on the exams. Some problems may require computing and must include concise computer output with a clearly presented version of your code.

Late homework will not be accepted. You may drop your lowest percentage score.

Exams: There will be one in-class midterm Thursday, March 17, with a take-home portion due approximately the same week. The in-class part of the exam will be closed book. A hand calculator is necessary for all exams. *No collaboration of any kind is allowed on the take-home part of the exam.*

No makeup exams are given - no exceptions.

The final exam will be given Tuesday, May 17 from 3:30 p.m. to 5:30 p.m. in GMCS 308. The final will be cumulative and comprehensive.

Project: As part of the course you will be asked to do an individual project. The project grade will be based in part on a brief 5-10 minute presentation (depending on the size of the class) during the last full week of classes and a brief 3-5 page written report in journal style format (i.e., 12 *pt* font, one inch margins, single-spaced, figures and tables clearly presented and labeled at the end of the abstract, page limit does not include figures, tables, nor bibliography).

You are required to attend *all* project presentations. Attendance at the presentations will be a part of your project grade.

The project will be done individually. You will illustrate and present the importance of nonparametric statistical concepts in the literature. In consultation with me, you may may choose a journal article of interest to you. As part of the project, expect to read the journal article, write a report, and give an oral presentation to demonstrate a thorough understanding of and to illustrate the techniques/methods used in the article.

Grading: The grade for the class is based on a score composed of the following.

Homework	30 %
Midterm Exam	30 %
Project	10 %
Final Exam	30 %

Topics to be covered: basic outline; topics may be added and/or dropped as the semester proceeds.

1. Dichotomous Data
   a. Binomial Tests
   b. Point Estimation and Confidence Intervals
2. One-Sample Location Problems
   a. Sign Rank Test
   b. Sign Test
   c. Point Estimation and Confidence Intervals
3. Two-Sample Location Problems
   a. Rank Sum Test
   b. Point Estimation and Confidence Intervals
4. One-Way Layout and Two-Way Layout
   a. Kruskal-Wallis and Friedman tests

   b. Multiple Comparisons
5. Independence Problems
   a. Efron's Bootstrap
6. Regression and Density Estimation Problems
   a. Smoothers and Kernels
   b. Density Estimation

Prerequisites: A calculus-based statistics course (STAT 551B or 670B).

Tardiness and Early exits: The class time is from 4:00 - 5:15 p.m. As common courtesy to your fellow students, we would appreciate if you show up to class on time and leave when dismissed at 5:15. If you must leave early, please inform me and sit on the aisle near an exit so as not to disturb students listening to and trying to learn from the lectures.

Code of Academic Conduct on Examinations and Assignments: "At San Diego State University, students are invited to be active members of the educational community. As with any community, its members serve a vital role in determining acceptable standards of conduct, which includes academic conduct that reflects the highest level of honesty and integrity." The "Statement of Student Rights and Responsibilities clarifies for students their role as members of the campus community, setting forth what is expected of them in terms of behavior and contributions to the success of our university." "Inappropriate conduct by Students . . . is subject to discipline on all San Diego State University Campuses. The Center for Student Rights and Responsibilities coordinates the discipline process and establishes standards and procedures in accordance with regulations contained in Sections 41301-41304 of Title 5 of The California Code of Regulations, and procedures contained in Executive Order 628, Student Disciplinary Procedures for The California State University." See http://www.sa.sdsu.edu/srr/judicial for more information.

Other information: See course web page: http://rohan.sdsu.edu/~babailey/stat672