STAT 513, Theory of Statistical Inference -- Fall 2022

Instructor:
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Course Web Page: http://people.stat.sc.edu/hitchcock/stat513.html
(Also accessible via Blackboard)

Classes: Meeting Times: MWF 1:10 pm - 2:00 pm, LeConte College, Room 103

Office Hours: Monday, Tuesday, Wednesday, Friday, 10:45 am - 11:45 am, Thursday 10:00-11:00 am, or by appointment

Textbook: *Mathematical Statistics with Applications, 7th edition.* (2008), by Wackerly, D., Mendenhall, W., and Scheaffer, R.

Purpose: To provide a strong foundation in mathematical development of statistical inference methodology.

Prerequisite: STAT 512 with a grade of C or higher.

Course Outline: Chapters 10, 11, 14, and 16 of the Wackerly, Mendenhall, and Scheaffer textbook, along with some supplementary notes. Topics covered include: Hypothesis testing, Neyman-Pearson lemma, likelihood ratio tests, power, the theory of linear models including multiple linear regression and ANOVA, the Chi-square goodness-of-fit test, Chi-square inference for contingency tables, Bayesian inference, and advanced topics including survival analysis (only if time permits).

Learning Outcomes: Upon successful completion of this course, students should be able to: (1) form or calculate and interpret statistical hypotheses, error rates, and power; (2) construct appropriate hypothesis tests for basic settings (e.g., 1-sample and 2-sample for means and variances); (4) perform and derive estimators and tests within linear statistical models; (4) apply and understand the theory of chi-square tests for categorical data; (5) perform and interpret basic Bayesian statistical analyses; (6) understand the fundamentals of survival analysis (time permitting).

During Class: No cell phones may be on during class. Laptop computers must be put away during class time. Tablets (e.g., i-pads) may be used *only for note-taking*, only if flat on the desk like a traditional notebook. Students may not use tablets to look at web pages, play games, etc.

Exams: There will be three in-class exams (September 16, October 21, November 18) and a final exam on Wednesday, Dec. 7 at 12:30 p.m. Exams may not normally be made up, except in extreme circumstances, for which written documentation of excuse (doctor's note, funeral notice, etc.) is required. If you suspect you may miss an exam day, it is important to contact me well in advance of the test date.

Homework: Weekly homework exercises will be assigned in class or on the course web page. These homework exercises will be collected and graded. You may work with other students in this class on these problems, but you should write your answers independently. Test problem(s) will often be similar in nature to assigned homework problems. Therefore you are personally responsible for knowing how to do each homework problem (even if you worked in a group on the homework). So it is important that you understand how to solve the homework problems! Please write your homework answers NEATLY on the pages provided (you can use other paper for preliminary scratch work, but neatly copy your final solution).

Project: STAT 513 is defined as an Integrative Course in the Carolina Core. As such, it includes a component that integrates broad ideas underlying the statistics major as well as themes contained in the Carolina Core. This component will be a required data analysis project involving a written summary report, either about a real data analysis or a more detailed exploration of a topic you have learned about it this class or other 500-level STAT classes. Information will be given out separately about the project, but a short proposal will be due around the middle of the semester, and the final project report will be due near the end of the semester.

Course Notes: Some pdf files with the (incomplete) notes I will be following in class are available on the course web page. It is recommended (though not required) that you print these notes out ahead of time and bring them to class where you can fill in the blank parts.

Graduate Students: Any students enrolling in the course for graduate credit will do some extra homework problems during the semester.

Disabilities: Any student with a documented disability should contact the Student Disability Resource Center at 777-6142 to make arrangements for appropriate accommodations.

Grading: The course grade will be based on homework average (12%), project (6%), the three midterm exams (20% each), and a comprehensive final exam (22%). The lowest midterm exam score may be replaced by the final exam score (if the final exam score is higher). The overall course average will result in the following grades: 90-100 = A, 87-89 = B+, 80-86 = B, 77-79 = C+, 70-76 = C, 67-69 = D+, 60-66 = D, 59 and below = F.