Instructor: Joshua M. Tebbs, Professor, Department of Statistics
Prerequisite: STAT 512 with a grade of C or higher
Class Time: 10:05-11:20am TTh in LeConte 224
Office: LeConte 217
Office Hours: Open door policy
email: tebbs@stat.sc.edu
url: http://people.stat.sc.edu/tebbs/

Required Course Material:

- Wackerly, D., Mendenhall, W., and Scheaffer, R. *Mathematical Statistics with Applications*, 7th edition. Copyright 2008, Duxbury.

Course Information: This course is a continuation of STAT 511-512 and introduces you to topics in mathematical statistics and statistical inference. From Wackerly, Mendenhall, and Scheaffer (WMS), we will cover the following chapters/topics:

- Hypothesis Testing (Chapter 10): Type I/II Error, power, large-sample and exact tests, uniformly most powerful tests, likelihood ratio tests.

- Bayesian Inference (Chapter 16): The Bayesian paradigm, prior model selection, posterior computation, point estimation, credible intervals.

- Linear Models (Chapters 11-13): Matrix formulation, random vectors, full rank (regression) models, ANOVA models, sampling distributions, F tests, confidence and prediction intervals.

- Analysis of Categorical Data (Chapter 14): Contingency tables, χ^2 tests, goodness-of-fit, independence.

- Survival Analysis (Course notes only): Lifetime distributions, censoring, hazard functions, life-table estimates, Kaplan-Meier estimator, two-sample (log-rank) tests.

We will start by discussing asymptotic considerations from Chapter 9. I usually cover this in STAT 512, but I ran out of time last semester.

Homework Assignments: There will be 8-10 homework assignments during the semester. I will write the assignments myself; some questions from WMS may be used.

Exam Schedule: We will have one midterm exam after we cover the hypothesis test chapter (above) and another midterm halfway through the linear model chapter. The midterm exams will be "take-home" and will last 24-48 hours. Midterm exam dates will be announced in class well in advance. A cumulative (in-person) final examination will be on Tuesday, December 12 at 9:00am.

Grade Breakdown: Your course grade will be determined by your performance on homework (20 percent), midterm exams (20 percent each), classroom participation (10 percent)

and the final exam (30 percent). Final course grades will be assigned according to a 90-80-70-60 schedule. Plus grades of B+, C+, and D+ may be assigned near the borders.

Additional comments:

- Mathematical courses like STAT 513 can be challenging, and very few students are able to master the material without keeping up on a regular basis. My homework assignments are designed to keep you working while exposing you to different types of questions you might see in the future (e.g., my exams, actuarial exams, other courses, etc.).

- In this course, many students are overwhelmed by the amount of algebra and calculus that is performed in lectures, homework problems, and examinations. It is strongly recommended that you review calculus concepts such as real functions, limits, graphical methods, differentiation, integration, sequences and series, exponential and logarithmic functions, partial derivatives, multiple integrals, etc. **This is a course that introduces you to statistics from a mathematical point of view.** If your algebra and calculus skills are rusty, then you will have problems learning the material, and you will likely do poorly in this class.

- Working together on homework problems is permitted and encouraged. However, each student will write up his/her solutions independently of others. In other words, duplicate or "copycat" solutions will be identified and penalized harshly. Naturally, cheating on exams is an extremely serious offense and will be dealt with in the harshest possible way.

- Students with documented disabilities who need special accommodations with exams or other aspects of the course should contact the Office of Student Disability Services.

Computing: We will use R. It is OK if you do not know R (or have never heard of it), because you will learn by example. The R package is available for free at `www.r-project.org`; the latest version is R 4.3.1 (2023-06-16, Beagle Scouts). The "An Introduction to R" manual available at this site (on the left, under "Manuals") is an excellent resource.