Instructor: Joshua M. Tebbs, Professor and Chair, Department of Statistics
Prerequisite: MATH 241 (or concurrent enrollment)
Class Time: 8:30-9:45am TTh in 011 Callcott
Office: 215C LeConte (tel: 803-576-8765)
Office Hours: By appointment only
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 will give you an introduction to probability and distribution theory. The material serves as a basis for STAT 512 and STAT 513 and is also useful and fascinating in its own right. STAT 511 (MATH 511) has a prerequisite of multivariate calculus, and a strong mastery of differentiation, integration, series/sequences, and related facts is necessary. From Wackerly, Mendenhall, and Scheaffer (WMS), we will cover the following chapters:

- Probability (Chapter 2): Set theory, probability axioms, probability rules, counting techniques, conditional probability, Bayes' rule.

- Discrete Distributions (Chapter 3): Random variables, probability mass functions, mathematical expectation, moment-generating functions, named discrete distributions (e.g., binomial, geometric, Poisson, etc.).

- Continuous Distributions (Chapter 4): Random variables, probability density functions, cumulative distribution functions, mathematical expectation, moment-generating functions, named continuous distributions (e.g., exponential, normal, beta, etc.), Chebyshev's Theorem, mixture distributions.

- Multivariate Distributions (Chapter 5): Random vectors, joint, marginal, and conditional distributions, conditional expectation, bivariate normal distribution, multinomial distribution, covariance and correlation.

We will focus on both theory and application in this course. You will be expected to derive theoretical results using algebra and calculus and apply these results to problems in different applications.

Note: This course is important for those of you considering careers in actuarial science. Exam P (Probability) essentially consists of Chapters 2-7 from WMS.

Homework Problems: There will be 12 homework assignments during the semester. The problems assigned come from WMS and solutions to these problems are available on the course web page.

Exam Schedule: We will have one midterm exam after each chapter covered (i.e., one after Chapter 2, one after Chapter 3, and so on). Each midterm exam will be "take-home" and will last 24 hours. Specific midterm exam dates will be announced in class as we near completing each chapter. A cumulative final examination will be on Tuesday, December 8, at 9:00am. The precise format and length of the final exam will be decided (by me) at a later date.

Grade Breakdown: Your course grade will be determined by your performance on the midterm exams (50 percent; 12.5 percent each) and the final exam (50 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:

- I reserve the right to modify any aspect of this syllabus in the event of unforseen circumstances. Any such modifications would be announced in class and through email.

- Please note that I do not give make-up examinations unless your absence is due to a university function, you have given me appropriate documentation, and you have discussed it with me at least one week in advance. I may make exceptions to this rule in the event of illness; these will be handled on a case-by-case basis.

- Mathematical courses like MATH/STAT 511 can be challenging, and very few students are able to master the material without keeping up on a regular basis. 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 probability 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 should write up his/her solutions independently of others (this will help greatly). 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 4.0.2 (2020-06-22, Taking Off Again). The "An Introduction to R" manual available at this site (on the left, under "Manuals") is an excellent resource.