STAT 515: Statistical Methods I

Fall 2024

Instructor:	Ray Bai	**Time:**	MWF 2:20 PM – 3:10 PM
Email:	RBAI@mailbox.sc.edu	**Place:**	LeConte 103

Course Page:

https://blackboard.sc.edu/ (Check regularly for announcements and homework assignments)

Instructor Office Hours: Mondays and Wednesdays 3:30-4:30 pm in LeConte 207 or by appointment

Teaching Assistant: TBA

TA Office Hours: TBA

Course Description: STAT 515 is an introduction to commonly used statistical methods. The course covers applications and principles of elementary probability, essential discrete and continuous probability distributions, sampling distributions, estimation and hypothesis testing; inference for proportions, means, and variances; linear regression, contingency tables, and one-way ANOVA.

The tentative schedule of topics is:

- **Week 1-2**: basics of sets, probability, counting rules, conditional probability, independence, and Bayes' theorem
- **Week 3-5**: random variables, Bernoulli trials, binomial and Poisson distributions, continuous random variables, normal and exponential distributions
- **Week 6-7**: sampling distributions, Central Limit Theorem
- **Week 8-10**: confidence intervals and hypothesis testing for means and proportions
- **Week 11-12**: two-sample inference for differences of means and proportions
- **Week 13**: simple linear regression
- **Week 14**: one-way analysis of variance
- **Week 15**: contingency tables, association between categorical variables

Learning Outcomes:

1. Be familiar with basic set theory, probability, and commonly used probability distributions.

2. Understand the usefulness of the Central Limit Theorem and its applications.

3. Be able to conduct statistical inference for proportions, means, and differences between proportions or means using confidence intervals and hypothesis testing.

4. Learn to perform simple linear regression, test for associations between categorical variables, and conduct one-way ANOVA.

Prerequisites: Grade of C or higher in MATH 122 or MATH 141; **OR** both MATH 111 or higher and any statistics class

Main References: We will use typed handouts prepared by the instructor. Parts of these lecture notes are *not* complete and will be filled in during lecture. There is **no required** textbook in this class.

Computing: We will use the software R for some examples in the class. You can download R for free from https://www.r-project.org/. The basics of R will be taught in class. No previous experience with R is required to take this class.

Homework: There will be 8-10 homework assignments. Students are allowed to discuss the problems and work together with their classmates, but each student must write up and turn in their **own** solution.

Exams: There will be two in-class midterms and one final exam. The dates for the midterms are **September 27** and **November 8**. The final exam is on **Friday, December 13 at 12:30 pm**. Students may *not* take the final exam early, so please do *not* plan any travel for the holiday break prior to the final exam.

Graduate students: In accordance with Graduate School policy, graduate students who are enrolled in this course for credit must be given extra work that, if not completed, will cause the letter grade to drop by one whole letter. Graduate students taking this class for credit are <u>required</u> to write a report in the style of an academic article that either:

- discusses an article from the academic literature that employs methods discussed in the class, **OR**

- analyzes an original dataset not discussed in the class using methods covered in the class.

More details will be discussed individually with the graduate students in this class. Graduate students who do not complete this paper satisfactorily will have their grade decreased by 11 points (A → B, B+ → C+, etc.). Undergraduate students are **not** required to do this extra assignment.

Grading: Your grade will be determined according to the following distribution:

- Homework: 20%

- Midterm 1: 25%

- Midterm 2: 25%

- Final Exam: 30%

The grading scale is as follows: 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.

Accommodation: If you need special accommodations for examinations or any other aspects of the course, please contact me before or during the first week of the semester. Note that reasonable accommodations are available for students with a documented disability. If you have a disability and may need accommodations to fully participate in this class, contact the Office of Student Disability Services by phone (803-777-6142) or e-mail sasds@mailbox.sc.edu. All accommodations must be approved through the Office of Student Disability Services.

Honor Code: See the Carolinian Creed in the *Carolina Community: Student Handbook and Policy Guide*. The *minimum* punishment for violations of the USC Honor Code is a grade of zero for the work in question. In accordance with university policy, there may be other punishments, including an automatic F in the class and/or expulsion from the university.