STAT 515: Statistical Methods I

Spring 2025

Instructor:	Ray Bai	**Time:**	MWF 2:20 PM – 3:10 PM
Email:	RBAI@mailbox.sc.edu	**Place:**	Callcott 101

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: Sijian Fan, sfan@email.sc.edu

TA Office Hours: Tuesdays and Thursdays 1:00 pm-2:00 pm in LeConte 204

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; simple linear regression, and one-way ANOVA.

The tentative schedule of topics is:

- **Week 1-3**: basics of sets, probability, counting rules, conditional probability, independence, and Bayes' theorem
- **Week 4-5**: random variables, Bernoulli trials, binomial and Poisson distributions, continuous random variables, normal and exponential distributions
- **Week 6-7**: sampling distributions, Central Limit Theorem
- **Week 8-11**: confidence intervals and hypothesis testing for means and proportions
- **Week 12-13**: two-sample inference for differences of means and proportions
- **Week 14**: one-way analysis of variance (ANOVA)
- **Week 15**: simple linear regression

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 means, proportions, and differences between means or proportions using confidence intervals and hypothesis testing.
4. Learn to conduct one-way ANOVA and perform simple linear regression.

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. However, the class notes are mainly based on selected chapters from the following textbook:

Mohr, D. L., Wilson, W. J., and Freund, R. J. (2021). *Statistical Methods*, 4th Ed. Academic Press.

Calculators: In-class exams **require** the use of a calculator (scientific **or** graphing). It is not necessary to own a graphing calculator.

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 10 homework assignments and an optional extra credit homework. 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 **Monday, February 24** and **Monday, April 7**. The final exam is on **Monday, May 5 at 12:30 pm**. Students may *not* take the final exam early, so please do *not* plan any travel for the summer break prior to the final exam.

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

- Homework: 20%
- Midterm 1: 25%
- Midterm 2: 25%
- Final Exam: 30%

The tentative grading scale is as follows: 90-100 = A, 86-89 = B+, 80-85 = B, 76-79 = C+, 70-75 = C, 66-69 = D+, 60-65 = D, 59 and below = F. This may be adjusted.

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.