

# STAT 714: LINEAR STATISTICAL MODELS

Fall 2020

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<b>Instructor:</b> Ray Bai	<b>Time:</b> MWF 1:10 PM – 2:00 PM
<b>Email:</b> <a href="mailto:RBAI@mailbox.sc.edu">RBAI@mailbox.sc.edu</a>	<b>Place:</b> Online (Zoom)

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## Course Page:

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

**Virtual Office Hours:** Tuesdays and Thursdays 1:30-2:30 pm, or by appointment (over Zoom)

**Main References:** We will use a packet of course notes prepared by the instructor. Parts of these lecture notes are *not* complete and will be filled in during lecture. Thus, it is in your best interest to attend every lecture.

No textbook is required. However, the following books may be useful as supplementary references:

- Christensen, R. (2002). *Plane Answers to Complex Questions*. Springer.
- Monahan, J. (2008). *A Primer on Linear Models*. CRC Press.

**Overview:** The purpose of this course is to provide an introduction to the theory of linear models. This is a **graduate-level theoretical course** involving rigorous proofs and derivations. Discussion of results from linear algebra will be incorporated into lectures as needed; however, you are expected to have a strong familiarity of this material already.

**Objectives:** The course covers the theory of the linear model, including least squares and generalized least squares (GLS) estimation, the Gauss-Markov theorem, distributional theory, and hypothesis testing. If time permits, some additional topics will be discussed, such as generalized linear models (GLMs) and regularized regression models.

**Prerequisites:** A year-long sequence in mathematical statistics and a course in linear algebra.

**Homework:** There will be nine short homework assignments. For each assignment, I will randomly pick two questions to be handed in. Assignments should be submitted through Blackboard **as a pdf file**. You may either type your answers up in L<sup>A</sup>T<sub>E</sub>X or use the free phone app Fast Scanner to create a pdf of your written work. In order to master the material, you should spend an ample amount of time on each assignment.

**Exams:** There will be three timed pencil-and-paper exams (two midterms and a final). The exams will be uploaded to Blackboard during a specific date and time, and I will proctor the exams over Zoom. One double-sided 8.5" × 11" sheet of notes is allowed for the exams. Tablets and calculators are *not* permitted during exams. At the end of the exam, you will have 10-15 minutes to take pictures of your answers and upload them to Blackboard. **Please consider using the free phone app Fast Scanner**, which will create a pdf of your exam answers when you take pictures of them on your phone.

The exam dates will be announced later. I will be sure to give at least two weeks notice before each exam.

**Grading Policy:** Homework (10%), Exam 1 (25%), Exam 2 (25%), Final (40%). The final is cumulative, but overwhelming emphasis will be placed on the material post-Exam 2.

The tentative grading scale is as follows: 90-100 for an A, 85-89 for an A-, 80-84 for a B+, 70-79 for a B, 60-69 for a B-, 0-59 for a C.

**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.

**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), e-mail [sasds@mailbox.sc.edu](mailto:sasds@mailbox.sc.edu), or stop by LeConte College Room 112A. All accommodations must be approved through the Office of Student Disability Services.