

MATH 8010-001

General Linear Hypothesis I

A.K.A. Theory of Linear Models

Fall 2016

Instructor: Dr. Andrew Brown

Office: O-309, Martin Hall

Office Phone: (864) 656-1716¹

Office Hours: Wednesdays, 9:00 am - 10:00 am

Email: ab7@g.clemson.edu

Lecture Hours: 11:15 am - 12:05 pm, MWF, M-203, Martin Hall

Prerequisites: Students are expected to have completed a course in linear algebra and a course in mathematical statistics before enrolling in the course.

Required Text: *Linear Models in Statistics*, 2nd ed., by Alvin Rencher and Bruce Schaalje. Other useful references include *Plane Answers to Complex Questions*, by Christensen, and *Theory and Application of the Linear Model*, by Graybill.

Additional Course Resources: Please check the course webpage on Blackboard often for supplementary course material.

Email Communication: I will use your Clemson email address as the primary mode of communication for sending class announcements, etc. You are responsible for messages sent to your Clemson email inbox. If you want sensitive information (e.g., an exam grade) via email, I will only respond to emails sent from your Clemson email (xxxx@clemson.edu or xxxx@g.clemson.edu), not Gmail, Yahoo, etc.

¹Email is my preferred mode of communication. It will probably be easier to get in touch with me that way.

Learning Outcomes: Upon successful completion of the course, a student should be able to:

- Describe least squares estimation as a projection in Euclidean space
- Use the theory of random vectors to find the distributions of linear transformations and quadratic forms
- Derive the general likelihood ratio test for a linear model

Topics to be Covered: The (tentative) outline for the course includes the following topics: Review of linear algebra; random vectors and matrices, including distribution theory for quadratic forms; estimation in the full-rank linear model; inference for the full-rank linear model; non-full rank/overparameterized models, including estimability, testability, parameterizations, and constraints. Additional selected topics, if time permits.

Homework: Homework will be assigned periodically to be graded and returned to you in a timely manner. All assignments are to be handed in by 12:05 pm on the due dates. **NO LATE HOMEWORK WILL BE ACCEPTED UNDER ANY CIRCUMSTANCES.** To accommodate unusual circumstances that prevent the completion of homework, the lowest homework grade will be dropped from evaluation of the homework average.

Exams: There will be two (2) in-class exams. **THERE WILL BE NO MAKE-UP EXAMS ALLOWED UNDER ANY CIRCUMSTANCES.** To accommodate unusual circumstances that prevent you from being present for an exam, the final exam will replace your lowest exam grade. If the final exam *is* your lowest grade, the other two exam scores will both count and the final exam score will be averaged in as the final exam component alone. The (tentative) dates for the two exams are:

- Wednesday, September 21
- Wednesday, October 26

Final Exam: The final exam will be given on **Tuesday, December 6, 8:00 am - 10:30 am.**

Grade Evaluation: Your course grade will be evaluated according to the following weights: Homework average, 10%; Average of two exams, 60%; Final exam, 30%.

Attendance Policy: You are graduate students. I expect you to be mature enough to attend class without me forcing you to. If you must miss a day, you need not inform me ahead of time. **You are responsible for any material that is covered in your absence.** In accordance with university policy, “[i]f no advance arrangements are made, students are authorized to leave after a fifteen minute wait (on an absent instructor or substitute).”

Important Dates:

- Tuesday, August 23: End of add period
- Tuesday, August 30: End of drop period
- Friday, October 7: Midterm grades reported
- Friday, October 21: Withdrawal deadline
- Monday, November 7 - Tuesday, November 8: Fall break, no class
- Wednesday, November 23 - Friday, November 25: Thanksgiving break, no class
- Tuesday, December 6, 8:00 am - 10:30 am: Final Exam

Academic Integrity Policy: “As members of the Clemson University community, we have inherited Thomas Green Clemson’s vision of this institution as a ‘high seminary of learning.’ Fundamental to this vision is a mutual commitment to truthfulness, honor, and responsibility, without which we cannot earn the trust and respect of others. Furthermore, we recognize that academic dishonesty detracts from the value of a Clemson degree. Therefore, we shall not tolerate lying, cheating, or stealing in any form.” I take academic honesty very seriously and will pursue appropriate measures in instances of suspected cheating. “Cheating” includes, but is not limited to, (i) turning in work that someone else did for credit; e.g., turning in code that someone else wrote, output someone else generated, etc., (ii) plagiarism, and (iii) inappropriate contact or conduct during an exam; e.g., talking to other students or having extra resources with you that are not allowed.

Disability Access: Clemson University values the diversity of our student body as a strength and a critical component of our dynamic community. Students with disabilities or temporary injuries/conditions may require accommodations due to barriers in the structure of facilities, course design, technology used for curricular purposes, or other campus resources. Students who experience a barrier to full access to this class should let the professor know, and make an appointment to meet with a staff member in Student Accessibility Services as soon as possible. You can make an appointment by calling 864-656-6848, by emailing studentaccess@lists.clemson.edu, or by visiting Suite 239 in the Academic Success Center building. Appointments are strongly encouraged – drop-ins will be seen if at all possible, but there could be a significant wait due to scheduled appointments. Students who receive Academic Access Letters are strongly encouraged to request, obtain, and present these to their professors as early in the semester as possible so that accommodations can be made in a timely manner. It is the student’s responsibility to follow this process each semester. You can access further information here: <http://www.clemson.edu/campus-life/campus-services/sds/>.

Clemson University Title IX (Sexual Harassment): Clemson University is committed to a policy of equal opportunity for all persons and does not discriminate on the basis of race, color, religion, sex, sexual orientation, gender, pregnancy, national origin, age, disability, veteran’s status, genetic information, or protected activity (e.g., opposition to prohibited discrimination or

participation in any compliant process, etc.) in employment, educational programs and activities, admissions, and financial aid. This includes a prohibition against sexual harassment and sexual violence as mandated by Title IX of the Education Amendments of 1972. This policy is located at <http://www.clemson.edu/campus-life/campus-services/access/title-ix/>. Mr. Jerry Knighton is the Clemson University Title IX Coordinator. He is also the Director of Access and Equity. His office is located at 110 Holtzendorff Hall, 864-656-3184 (voice) or 864-565-0899 (TDD).

The course syllabus is a general plan for the course. Deviations that may be necessary will be announced to the class.