

## Syllabus

**Course Web Page:** <http://rohan.sdsu.edu/~babailey/stat700>  
and [blackboard.sdsu.edu](http://blackboard.sdsu.edu)

**Meeting Time:** Lectures: MW 5:30 - 6:45 p.m. GMCS 325

**Instructor:** Professor Barbara Bailey  
GMCS 513  
email: [babailey@sciences.sdsu.edu](mailto:babailey@sciences.sdsu.edu)  
Office Hours: M 2:00-3:00 p.m., W 3:00-4:00 p.m.; by appointment

**Reference:** The textbook for the course is

West, B. T., Welch, K. B., and Galecki, A. T. (2007). *Linear Mixed Models: A Practical Guide Using Statistical Software*, Chapman Hall/CRC Press.

**Objectives:** This course will provide students with basic theory and tools for advanced, computationally intensive data analysis techniques and applications. The technique areas include random and mixed effects models, repeated measures and longitudinal data analysis, generalized linear models, multilevel models, and nonlinear models.

With the explosion of computing power, data analysis methods for handling massive amounts of messy data with intricate correlation and signal patterns has become the norm. The course will equip students with the knowledge to apply and communicate statistical inference drawn from modern computational intensive data analysis techniques used in statistical practice.

**Homework:** Homework assignments will be regularly available on the course web page as announced in class. The homework will contain a series of practice problems of which *selected problems* will be graded. The homework serves as a tool to review and practice the material covered in class. All material covered on the assignments can be questioned on the exams. Some problems may require computing and must include concise computer output with a clearly presented version of your code.

Late homework will not be accepted. You may drop your lowest percentage score.

**Exams:** There will be one in-class midterm Wednesday October 12, with a take-home portion due approximately the same week. The in-class part of the exam will be closed book. A hand calculator is necessary for all in exams. *No collaboration of any kind is allowed on the take-home part of the exam.*

**No makeup exams are given - no exceptions.**

The final exam will be given Friday, December 16 from 1:00 p.m. to 3:00 p.m. in GMCS-325. The final will be cumulative and comprehensive.

**Project:** As part of the course you will be asked to do an individual data analysis project. The project grade will be based in part on a brief 5-10 minute presentation (depending on the size of the class) during the last full week of classes and a brief 3-5 page written report in journal style format (i.e., 12 pt font, one inch margins, single-spaced, figures and tables clearly presented and labeled at the end of the abstract, page limit does not include figures, tables, nor bibliography).

You are required to attend *all* project presentations. Attendance at the presentations will be a part of your project grade.

The project will be done individually. You will illustrate and present data analysis concepts from the class or literature. In consultation with me, you may choose a project of interest to you. As part

of the project, expect to read the appropriate literature, write a report, and give an oral presentation to demonstrate a thorough understanding of and to illustrate the techniques/methods used in the class and article.

**Grading:** The grade for the class is based on a score composed of the following.

Homework	30 %
Midterm Exam	30 %
Project	10 %
Final Exam	30 %

**Topics to be covered:** basic outline; topics may be added and/or dropped as the semester proceeds.

1. Review Linear Models and ANOVA
  - a. Matrix Theory
  - b. Estimation and Projections
  - c. Quadratic Forms
  - d. Inference about Normal Models
2. Linear Mixed Models
  - a. Fixed Effects vs. Random Effects
  - b. Estimation of Parameters
  - c. Computational Issues
  - d. Hypotheses Testing
  - e. Model Building Strategies
  - f. Model Diagnostics
3. Multilevel Models
4. Models for Repeated-Measures Data
5. Models for Longitudinal Data
6. Nonlinear Models
  - a. Nonlinear Least Squares
  - b. Nonlinear Mixed Models

**Prerequisites:** STAT 551B or 670B and STAT 510

**Tardiness and Early exits:** The class time is from 5:30 - 6:45 p.m. As common courtesy to your fellow students, we would appreciate if you show up to class on time and leave when dismissed at 6:45. If you must leave early, please inform me and sit on the aisle near an exit so as not to disturb students listening to and trying to learn from the lectures.

**Code of Academic Conduct on Examinations and Assignments:** “At San Diego State University, students are invited to be active members of the educational community. As with any community, its members serve a vital role in determining acceptable standards of conduct, which includes academic conduct that reflects the highest level of honesty and integrity.” The “Statement of Student Rights and Responsibilities clarifies for students their role as members of the campus community, setting forth what is expected of them in terms of behavior and contributions to the success of our university.” “Inappropriate conduct by Students . . . is subject to discipline on all San Diego State University Campuses. The Center for Student Rights and Responsibilities coordinates the discipline process and establishes standards and procedures in accordance with regulations contained in Sections 41301-41304 of Title 5 of The California Code of Regulations, and procedures contained in Executive Order 628, Student Disciplinary Procedures for The California State University.” See <http://www.sa.sdsu.edu/srr/judicial> for more information.

**Other information:** See course web page: <http://rohan.sdsu.edu/~babailey/stat700>