

Statistical Methods III STAT 212

Lectures: Monday and Wednesday, 3:30-4:50, Room: ICS 243

Discussion: Tuesday, 2:00-2:50, Room: BH 1423

Discussion section will primarily be used to cover case studies and the application of methods presented in class. In addition, homework questions will also be addressed during the discussion hour.

Course Web Site: Located at <http://www.ics.uci.edu/~dgillen/Stat212WebPage.htm>. Electronic copies of the course handouts and homework assignments as well as datasets used during the course will be posted on the web site.

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Office hours: Tuesday & Wednesday 11:00-12:00,
and by appointment

Prerequisites: Statistics 211 (Statistical Methods II) or equivalent; or permission of instructor

Description: This course will provide cover regression methods (theory and application) for correlated data, with an emphasis on longitudinal data. Correlated data occurs extensively in both observational and experimental studies, as well as in industrial applications. The course will focus on both theory and application of methods for data analysis. Problems will be motivated from a scientific perspective.

Required Text: *Applied Longitudinal Data Analysis* by Fitzmaurice G., Laird, L., and Ware J. Wiley Series in Probability and Statistics. 2004.

Recommended/reference texts: (On reserve in the science library)

- *Analysis of Longitudinal Data* by Diggle, P, Heagerty, P, Liang, KY, and Zeger, S. (2nd edition). Oxford University Press, 2002.
- *Linear Mixed Effects Models for Longitudinal Data* by Verbeke, G and Molenberghs, G. Springer-Verlag, 2000.
- *Mixed Effects Models in S and Splus* by Bates, DM and Pinheiro, JC. Springer-Verlag, 2000.

Course Notes: The notes presented in class are partially attributable to Patrick Heagerty (UWashington).

Software/Computing: Examples that are presented in class are primarily done using the R statistical package, and it is recommended that R be used for homework assignments and exams. R is free software which can be downloaded from the web at <http://www.r-project.org/>. R can be installed onto Windows, Mac, or Unix machines. In addition, the student computer lab in CS 364 will have R loaded onto all Windows machines. The website also offers many

tutorials regarding the use of R. If you wish, it is possible to use other commercially available software packages such as Splus, Stata, Matlab, or SAS.

Homework: There will be a total of 7 to 8 homework assignments. Assignments will typically be due 1 to 1.5 weeks from the date they are handed out.

Midterm Exam: Tentatively scheduled for Monday, May 14th. The exam will be in-class (closed-book, closed-note), and will cover material through the Wednesday, May 9th lecture.

Final Exam: The final exam is scheduled for Monday, June 11th. The final exam will be take-home and will consist of two portions. The first portion of the exam will consist of short answer questions similar to a comprehensive homework assignment. The second portion of the exam will be a complete statistical analysis and report pertaining to a particular scientific question. The final exam will be handed out on Monday, June 4th and due on Monday June 11th by 6pm.

Grading:

Homework:	30%
Midterm:	30%
Final:	40%

Course Objectives: By the end of this course, the student should be able to do the following:

- Understand the assumptions made by univariate regression methods
- Analyze polytomous and discrete survival response data in a regression context
- Formulate scientific questions involving correlated continuous or categorical response data as regression problems
- Understand the theory and assumptions underlying marginal models for correlated data
- Fit marginal regression models and assess the scientific significance, precision, and interpretation of regression coefficients
- Understand the theory and assumptions underlying linear mixed effects models for correlated data
- Fit linear and nonlinear mixed effects regression models and assess the scientific significance, precision, and interpretation of regression coefficients
- Interpret and critically evaluate regression analyses of correlated data in scientific manuscripts and research presentations
- Describe regression methods and results for correlated data to a non-statistical audience

Course Evaluations: The University will run online course evaluations over a two-week period, during 9th and 10th week. This two-week evaluation window is scheduled to open at 12:01 a.m. on Monday of 9th week and close at 11:59 p.m. on Sunday before finals week.