

BIostatistics 667

Applied Longitudinal Data Analysis, Fall 2010

Monday-Wednesday, 1:00-2:15 pm, Room: Michael Hooker Research Center 0003

Text: Available at Health Affairs Bookstore, Medical Drive

Required: Davidian, Marie (2005). *Applied Longitudinal Data Analysis*. Unpublished class notes (North Carolina State University, Stat 732).

Instructor: Lloyd J. Edwards, Ph.D.
Associate Professor, Department of Biostatistics
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Office Hours:	Time	Days	Location
Instructor: Lloyd Edwards	<u>11:00-12:00</u>	<u>Tue/Thu</u>	<u>3105H MCG</u>
Grader: Jeanine Matuszewski	<u>TBA</u>	<u>TBA</u>	<u>TBA</u>
Instructional Asst: TBA	<u>TBA</u>	<u>TBA</u>	<u>TBA</u>

Also by appointment, if necessary. Please call if you wish to see me or the instructional assistant.

Note: Just before class is not a good time to schedule a meeting with the instructor.

Course Prerequisites:

Students should be familiar with basic notions of probability, random variables, and statistical inference; analysis of variance; and (multiple) linear regression at the level of Bios 545 and/or Bios 663. Familiarity with matrix algebra is also useful. We will review matrix algebra at the beginning of the course and make considerable use of matrix notation and operations throughout. SAS will be used extensively in the class and hence students are expected to have had some exposure to the use of SAS. The course is meant to be accessible both to non-majors and majors. The underlying mathematical theory will not be stressed, and the main focus will be on concepts and applications.

Grading Procedure:

Grade based on 6 homeworks (50% of grade) and 2 exams (50% of grade). **ALL homeworks and exams are to be typed in a scientific word processor of your choice and emailed to the instructor as a PDF.**

Exam 1: Mid-Term covers all material up to Wednesday, October 20 (25% of grade).

Exam 2: Final Exam, cumulative with emphasis on post-Mid-Term material (25% of grade).

HOMEWORK / EXAM POSTPONEMENT POLICIES- PLEASE NOTE WELL:

An incomplete will result if any homework is not attempted in good faith.

I require a medical excuse or the equivalent to postpone a test. Call me as soon as possible!

Course Goals for the Student:

To introduce students to statistical models and methods for the analysis of longitudinal data, i.e. data collected repeatedly on individuals (humans, animals, plants, samples, etc) over time (or other conditions).

Lectures
Bios 667 - Fall 2010

Date	Topic	Chapter(s) in Textbook
Aug. 25	Bookkeeping, Introduction and Motivation	1
	Begin Review - Matrix Algebra	2
Aug. 30	Review	2, 3
	- Matrix Algebra	
	- Random Vectors and Multivariate Normal Distribution	
Sep. 1	Introduction to Modeling Longitudinal Data	4
Sep. 6	Labor Day - No Class	
Sep. 8	Introduction to Modeling Longitudinal Data	4
Sep. 13	Univariate Repeated Measures Analysis of Variance	5
Sep. 15	Univariate Repeated Measures Analysis of Variance	5
Sep. 20	Univariate Repeated Measures Analysis of Variance	5
Sep. 22	Multivariate Repeated Measures Analysis of Variance	6
	Drawbacks and Limitations of Classical Methods	7
Sep. 27	Drawbacks and Limitations of Classical Methods	7
Sep. 29	General Linear Models for Longitudinal Data	8
Oct. 4	General Linear Models for Longitudinal Data	8
Oct. 6	General Linear Models for Longitudinal Data	8
Oct. 11	General Linear Models for Longitudinal Data	8
Oct. 13	Random Coefficient Models for Multivariate Normal Data	9
Oct. 18	Random Coefficient Models for Multivariate Normal Data	9
Oct. 20	Random Coefficient Models for Multivariate Normal Data	9
Oct. 20-25	Fall Break: Begins Wed., 20OCT09, 5:00pm	--
	and Resumes Mon., 25OCT2010	--
Oct. 24-28	Mid-Term Take-Home Exam	1-9
	To be distributed 24OCT2010, Due 28OCT2010	
Oct. 27	Linear Mixed Effects Models for Multivariate Normal Data	10
Nov. 1	Linear Mixed Effects Models for Multivariate Normal Data	10

Lectures
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Date	Topic	Chapter(s) in Textbook/Notes
Nov. 3	Linear Mixed Effects Models for Multivariate Normal Data	10
Nov. 8	Linear Mixed Effects Models for Multivariate Normal Data	10
Nov. 10	Generalized Linear Models for Nonnormal Response	11
Nov. 15	Generalized Linear Models for Nonnormal Response	11
Nov. 17	Generalized Linear Models for Nonnormal Response	11
Nov. 22	Generalized Linear Models for Nonnormal Response	11
Nov. 24	Population-averaged Models for Nonnormal Repeated Measurements	12
Nov. 25	University Holiday, Thanksgiving Recess	
Nov. 29	Population-averaged Models for Nonnormal Repeated Measurements	12
Dec. 1	Population-averaged Models for Nonnormal Repeated Measurements	12
Dec. 6	Population-averaged Models for Nonnormal Repeated Measurements	12
Dec. 8	Class Summary / Last Day of Classes	1-12
Dec. 11 (12:00 pm)	Final Exam	1-12