

Biostatistics 411 Syllabus
<http://rem.ph.ucla.edu/rob/biostat411>

Course Objective:

To acquaint Public Health masters and doctoral students with methods for analyzing correlated data without requiring a high level of mathematical sophistication. The course should be helpful in the analysis of research data and doctoral dissertation projects.

Course Description:

This course presents various statistical techniques designed for the analysis of correlated data using a regression point of view. It includes longitudinal data analysis and clustered/nested data. It covers the use of random effects models and generalized estimation equations (GEE) and more. The emphasis is on how the data should be analyzed, rather than on theory. For computations, we rely on standardized software such as SAS.

Topics

1. Course business
2. Correlated data introduction
 - (a) Issues and Problems
 - (b) Longitudinal data
 - (c) Clustered data
3. Longitudinal models for continuous data
 - (a) Language
 - (b) Continuous Outcomes
 - (c) Without a time trend
 - (d) Linear time trend
 - (e) General time trend
 - (f) Treatment & Group Effects
 - (g) Random effects models
 - (h) Covariance Models
 - (i) Regression model
 - (j) Two level multi-level model
 - (k) Inference
4. Longitudinal models for discrete data
 - (a) Binary outcomes
 - (b) Count outcomes

- (c) Generalized Estimating Equations
 - (d) Random Effects Models
5. Hierarchical Models
- (a) Nesting
 - (b) Random Effects Models
 - (c) Binary Data

Sub-headings within a major heading will be covered as needed. Think of the sub-headings as a cluster sample rather than a longitudinal sample of topics.

Learning Objectives

Upon successful completion of the course, you should be able to:

1. Identify longitudinal and hierarchical data. (A.3, A.4)
2. Discuss issues involved in analyzing longitudinal and hierarchical data. (A.3, A.4)
3. Plot longitudinal data and interpret the plots. (A.5, A.6, A.7)
4. Develop and interpret a model for the population mean over time for longitudinal data. (A.4, A.6, A.7)
5. Develop an appropriate model for the correlation structure of longitudinal data. (A.6, A.7)
6. Choose and interpret appropriate models for continuous, binary and count longitudinal and hierarchical data. (A.2, A.3, A.4, A.6, A.7, A.9)
7. Interpret longitudinal and hierarchical model statistical output in terms of the original research question. (A.6, A.7, A.9)
8. Write up and interpret the results in a report. (A.9, A.10)

MPH Biostatistics Competencies in parentheses after each objective.