THE UNIVERSITY OF ARIZONA
Mel & Enid Zuckerman College of Public Health

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University of Arizona

BIOS 684 General Linear and Mixed Effects Models

Catalog Description: This course introduces basic concepts of linear algebra that are essential for understanding more advanced statistical modeling methodology. This knowledge is used to understand the General Linear Model (GLM) which includes linear regression, ANOVA, and other special applications and modern methods for the analysis of repeated measures, correlated outcomes and longitudinal data, including the unbalanced and incomplete data sets characteristic of biomedical research. Topics include an introduction to matrices for statistics, general linear models, analysis of correlated data, random effects models, and generalized linear mixed models. (3 units)

Course Topics:

- Modeling the Mean
- Modeling the Covariance
- Analyzing Longitudinal Data
- GLM
- GEE
- GLMM
- Multilevel Models
- Semiparametric Models

Course Objectives: During this course, students will:

- Describe the statistical methods utilized to analyze longitudinal data in a variety of settings and with a variety of types of outcome variables.
- Analyze a scientific problem that requires repeated measurements, identify an appropriate design, and identify the statistical methods required to analyze the data.
- Utilize R to perform longitudinal analyses of data generated from randomized and observational studies with repeated measures designs.
- Apply modern methods for the analysis of longitudinal data to a range of settings encountered in biomedical and public health research.
- Interpret and communicate the clinical/scientific meaning of the results of your longitudinal analysis.

Learning Outcomes (Competencies Obtained): Upon completion of this course students will be able to:

1. Define a problem and determine appropriate uses and limitations of data
2. Understand basic research designs used in public health
3. Make relevant inferences from data
4. Communicate effectively both in writing and orally
5. Interpret and present accurately and effectively demographic, statistical, and scientific information for professional and lay audiences adapting and translating public health concepts to individuals and communities
6. Lead and participate in groups to address specific issues, including ability to work in teams, span organizational boundaries and cross systems