



THE UNIVERSITY OF ARIZONA

Mel & Enid Zuckerman
College of Public Health

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University of Arizona**

BIOS 687 Theory of Linear Models

Catalog Description: Theory of linear models including full-rank models and less than full rank fixed effects models. Topics will include distributional properties of quadratic forms, estimation methods, tests of hypothesis and confidence intervals as well as an introduction to computational aspects. (3 units)

Course Topics:

- The General Linear Model
- Basic Linear Algebra
- Solving Equations, Generalized Inverses, Projections
- The Linear Least Squares Problem
- Model Reparametrization and Estimability
- Gauss Markov Theorem
- Distribution Theory
- Statistical Inference

Course Objectives: During this course, students will:

- Be presented with the necessary linear algebra and statistical theory to understand, derive, and implement standard statistical procedures for regression analysis and analysis of variance.

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

1. Understand the necessary linear algebra and statistical theory to derive and implement standard procedures for regression analysis and analysis of variance
2. Apply descriptive and inferential methodologies according to the type of study design for answering a particular research question
3. Communicate understanding of the assumptions necessary for a given statistical procedure as well as the ability to determine if the assumptions are met for a given study design or data set
4. Demonstrate the ability to identify, articulate and implement sound study design, methodological and computational strategies for addressing scientific questions
5. Demonstrate the use of statistical theory necessary for the development and study of new statistical methods or to adapt existing methods to new or unique problems.