STA 6246  Theory of Linear Models
Fall, 2004
Course Outline and Syllabus

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Office hours: Monday 2:00-5:00

Topics:

1. Introduction and review
   - Review of matrix algebra
   - Multivariate normal distribution
   - Chi-square distributions
   - F and t distributions

2. Distribution theory of quadratic forms
   - Probability distribution for quadratic forms of normal random vectors
   - Independence of quadratic forms
   - Moments of quadratic forms
   - Cochran’s theorem

3. Full rank linear models
   - Definition of full rank linear model
   - OLS estimation of full rank model
   - Gauss-Markov theorem
   - Properties of OLS estimates
   - Comparison of complete and reduced models
   - Inference in the full rank model

4. Less than full rank models
   - Review of generalized inverses
   - OLS estimation of less than full rank model
   - Estimable linear functions
   - Parametrization and restricted estimation
   - Inference in less than full rank model

5. Mixed models for balanced data
   - Notation and definitions
   - Population structures
   - Rules for deriving models and distribution properties
   - Inference in balanced mixed models
6. Fixed effect models for unbalanced data
   - The “R” notation for comparing models
   - Inference in fixed effect models
   - Implications for missing data

7. Mixed models for unbalanced data
   - ANOVA methods: expected mean squares and approximate inference
   - Estimation of variance components
     a. ANOVA
     b. Maximum likelihood
   - Generalized least squares methods

**Textbook:** *Theory of Linear Models*, course notes by Andre Khuri

**References:**

**Grading:**

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