

STATISTICS 537: SPRING, 2008

CLASSICAL MULTIVARIATE ANALYSIS

- Required Texts
 - Rencher, A.C. (2002). *Methods of Multivariate Analysis*, Second Edition. New York: Wiley.
 - Boik, R.J. (2008) *Course Notes: Statistics 537*.
- Instructor
 - Robert J. Boik, 2-260 Wilson, 994-5339, Rjboik@math.montana.edu.
 - Office Hours: Monday 12:10–1:00; Wednesday 12:10–1:00; Friday 10:00–10:50; & by appointment.
- Course Home Page:
<<http://www.math.montana.edu/~rjboik/classes/537/stat.537.html>>
- Holidays & Other “No Class” Days: Monday Jan 21 (Martin Luther King), Monday Feb 18 (Presidents Day), Monday–Friday Mar 10–14 (Spring Break), Friday March 21 (University Day).
- HW: Discussion about HW problems with colleagues is allowed, but written work must be done independently. Late HW will not be accepted without prior arrangements. Homework problems are graded as P, F, or re-do.
- Grading: A Midterm exam will be given on Wednesday March 5 at 6:00-8:00 PM (40%) in 1-117 Wilson. A Final exam will be given on Monday May 5 at 8:00–9:50 AM (60%) in 1-117 Wilson. All HW must be passed to earn a passing grade in STAT 537.

Syllabus

1. Introduction: Univariate versus Multivariate Analysis
2. Multivariate Data & Multivariate Distributions (Ch. 1, 2, 3, 4)
 - (a) Expectation and Dispersion of Random Matrices
 - (b) Multivariate Normal: Conditional and Marginal
 - i. Detecting Departure from MVN
 - ii. Transformations of Multivariate Data
 - (c) Correlation, Partial Correlation, and Regression
 - (d) Wishart and Conditional Wishart Distributions

- (e) Maximum Likelihood Estimation from MVN
 - i. Complete Data
 - ii. Incomplete Data: the EM Algorithm
 - (f) Robust Estimation
3. Multivariate Linear Models (Ch. 5, 6, 10)
 - (a) Hotelling's T^2 Tests
 - (b) The General Linear Model
 - (c) Test Statistics & Simultaneous Inference
 - (d) Classic Analysis of Repeated Measures & Growth Curves
 - (e) Generalized Analysis of Repeated Measures & Longitudinal Data
 - (f) Introduction to Proc Mixed
 4. Selected Inferences on Covariance Matrices (Ch. 7)
 - (a) Tests of Sphericity
 - (b) Tests of Homogeneity
 - (c) Tests of Independence
 - (d) Canonical Correlation
 5. Discriminant & Classification Analysis (Ch. 8, 9)
 6. Canonical Correlation Analysis (Ch. 11)
 7. Principal Components (Ch. 12)
 - (a) Common Principal Components
 - (b) Principal Components of Correlation Matrices
 8. Factor Analysis (Ch. 13)
 9. Cluster Analysis (Ch. 14)
 10. Classification Trees