UNIVERSITY OF CALGARY

FACULTY OF SCIENCE
Department of Mathematics and Statistics

STATISTICS 525
"MULTIVARIATE ANALYSIS"

Calendar Description: H(3-1)
Normal distribution. Statistical inference: confidence regions, hypothesis tests, analysis of variance, simultaneous confidence intervals. Principal components. Factor Analysis. Discrimination and classification. Canonical correlation analysis.

Prerequisite: Statistics 421 or consent of the Division.

Suggested Text: Applied Multivariate Statistical Analysis, 5th edition, by Johnson and Wichern

Syllabus

Topics	**Number of Hours**
Review of univariate, bivariate distributions, pdf, cdf, mgf. Normal, bivariate Normal, Gamma, t, χ^2, F, multinomial.	2
Random vectors and matrices. Mean vectors, covariance matrices. Linear transformations. Positive definite matrices, quadratic forms.	3
Multivariate Normal distribution: pdf, mgf, properties. Ellipsoids of constant probability, eigenvalues/eigenvectors of matrices. MLE's for μ and Σ. Random samples, sample mean, sample covariance matrix. The Wishart distribution, properties (including distribution of diagonal submatrices). Assessing normality.	8
Inferences about population mean vectors: Hotelling's T^2. Likelihood ratio tests. Confidence regions, simultaneous confidence intervals (Scheffé, Bonferroni). Large sample inference for population mean vectors, proportions. Missing observations.	6
Paired comparisons, independent samples. Repeated measures comparisons. Review of one-way ANOVA. One-way MANOVA. Profile analysis. Two-way MANOVA.	5
A selection of the following topics according to class/instructor interest.	
- Principal components	3
- Factor analysis	5
- Canonical correlation analysis	4
- Discrimination and classification	
- Clustering, multidimensional scaling	
TOTAL HOURS	**36**

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