

UNIVERSITY COLLEGE OF THE FRASER VALLEY

COURSE INFORMATION

DEPARTMENT: Mathematics

DATE: May 1994

Math 370
NAME & NUMBER OF COURSE

Methods of Multivariate Statistics
DESCRIPTIVE TITLE

4
UCFV CREDIT

CATALOGUE DESCRIPTION: The basis of the course is the extension of the linear model methods of Math 302 to the multi-variate situation. The emphasis of the course is on examination of a range of widely used multivariate statistical techniques, their relationship with familiar univariate methods and on the solution to practical problems. The entire theory of multivariate tests of significance by analysis of dispersion is obtained as a generalization of the univariate analysis of variance', C.R. Rao (1973).

COURSE PREREQUISITES: Math 221, 270, 302.

COURSE COREQUISITES:

HOURS PER TERM FOR EACH STUDENT	Lecture	45 hrs	Student Directed	
	Laboratory	30 hrs	Learning	hrs
	Seminar	hrs	Other - specify:	
	Field Experience	hrs	<hr/>	hrs
			TOTAL	75 HRS

UCFV CREDIT
TRANSFER

UCFV CREDIT
NON-TRANSFER

NON-CREDIT

TRANSFER STATUS (Equivalent, Unassigned, Other Details)

UBC credits

SFU credits

UVIC units

Other

Math Curriculum Committee
COURSE DESIGNER

J.D. TUNSTALL Ph.D.
DEAN OF ACADEMIC STUDIES

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COURSES FOR WHICH THIS IS A PREREQUISITE:
RELATED COURSES

Upper level Statistics courses.

TEXTBOOKS, REFERENCES, MATERIALS (List reading resources elsewhere)
TEXTS: TBA**Basic references:**

Rao, C.R. (1973) Linear statistical models, Chapter 8. John Wiley & Sons.

Timm, Neil H: `Multivariate analysis of variance of repeated measures' in P.R. Krishnaiah, ed, Handbook of Statistics: Analysis of Variance; Volume 1, pages 41-87, Amsterdam, North-Holland Publishing Company (1980).

Berhard Flury and Hans Riedwyl (1985), `T² Tests, the linear two-group discrimination function and their computation by linear regression', The American Statistician Vol 39, pages 20-25.**OBJECTIVES:**

1. Understand how a sound grasp of the univariate linear model can be simply developed into an intuitive understanding of the commonly used multi-normal statistical techniques.
2. Be conversant with the commonly used multivariate statistical methods and how to apply them to data sets using statistical software.
3. Become acquainted with the major multi-variate criteria for the comparison of competitive hypotheses, and inter-relationships of these criteria.

METHODS:**STUDENT EVALUATION PROCEDURE:**

Assignments	20%
In-class tests	40%
Final Examination	40%

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COURSE CONTENT

Expectation, dispersion and covariance of vector random variables.

The general multivariate normal distribution, its marginal and conditional distributions and properties.

Estimation of μ , and Σ ; the sums of squares and cross-products matrices. Sampling and the use of the basic results on the Wishart distribution, the distribution of special cases of the Wilks' lambda criterion and of Hotelling's T^2 .

Tests for assigned mean values, for a given structure of mean values, for differences between mean values of two populations. Fisher's linear discriminant. Relationship between linear discriminant analysis and linear regression. Mahalanobis' D^2 .

The Analysis of Dispersion, tests of linear hypothesis, test for additional information. Test for differences in mean values between several populations.

Multivariate regression. Repeated measures, growth curves.

Discussion of criteria and their relationships, Wilks' lambda, Hotelling-Lawley trace, Roy-Pillai largest root.

Discriminant analysis, the equivalent discriminant score.

Canonical correlations. Canonical discriminant functions. Principal components - use of covariance and correlation matrices.

The ideas underlying factor analysis; the principal factor method. More modern factor analysis methods illustrated by the use of appropriate software.