UNIVERSITY COLLEGE of the FRASER VALLEY

COURSE IMPLEMENTATION DATE:	January 1994
COURSE REVISED IMPLEMENTATION DATE:	September 1995
COURSE TO BE REVIEWED:	September 1999
(Four years after implementation date)	(MONTH YEAR format)

OFFICIAL COURSE OUTLINE INFORMATION

Students are advised to keep course outlines in personal files for future use.
Shaded headings are subject to change at the discretion of the department and the material will vary - see course syllabus available from instructor

FACULTY/DEPARTMENT: **MATHEMATICS**

MATH 470	**MATH 370**	**3**
COURSE NAME/NUMBER	FORMER COURSE NUMBER	UCFV CREDITS

METHODS OF MULTIVARIATE STATISTICS
COURSE DESCRIPTIVE TITLE

CALENDAR DESCRIPTION:

This 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 the solution to practical problems. Topics will include: Hostelling's T^2, the analysis of dispersion, repeated measures, discriminant analysis, canonical correlations, principal components, factor analysis.

PREREQUISITES: **Math 211, 221, 270, 302 and at least two upper level Math courses.**
COREQUISITES: **None**

SYNONYMOUS COURSE(S)
(a) Replaces: ____________
(Course #)
(b) Cannot take: ____________ for further credit.
(Course #)

SERVICE COURSE TO:
____
(Department/Program)
____
(Department/Program)

TOTAL HOURS PER TERM: **60**
STRUCTURE OF HOURS:

Lectures:	**60**	Hrs
Seminar:		Hrs
Laboratory:		Hrs
Field Experience:		Hrs
Student Directed Learning:		Hrs
Other (Specify):		Hrs

TRAINING DAY-BASED INSTRUCTION
LENGTH OF COURSE: ____________
HOURS PER DAY: ____________

MAXIMUM ENROLLMENT: **35**
EXPECTED FREQUENCY OF COURSE OFFERINGS: ____________

WILL TRANSFER CREDIT BE REQUESTED? (lower-level courses only)	☐ Yes	☐ No
WILL TRANSFER CREDIT BE REQUESTED? (upper-level requested by department)	☐ Yes	☒ No
TRANSFER CREDIT EXISTS IN BCCAT TRANSFER GUIDE:	☐ Yes	☐ No

AUTHORIZATION SIGNATURES:

Course Designer(s): ____________ Math Curriculum Committee
Chairperson: ____________ *(Curriculum Committee)*

Department Head: ____________
Dean: ____________ J.D. Tunstall Ph.D.

PAC Approval in Principle Date:
PAC Final Approval Date: January 25, 1995

LEARNING OBJECTIVES / GOALS / OUTCOMES / LEARNING OUTCOMES:

This course is designed to give students an opportunity to learn the elegant least squares linear model theory due to Gauss and Fisher.

This theory serves as the theoretical basis for much practice in statistics, economics, physics, neural networks, path analysis. Both the algebraic approach of the mathematicians the geometric approach of Fisher are covered.

METHODS:

PRIOR LEARNING ASSESSMENT RECOGNITION (PLAR):

Credit can be awarded for this course through PLAR (Please check :) ☐ Yes ☐ No

METHODS OF OBTAINING PLAR:

TEXTBOOKS, REFERENCES, MATERIALS:

[Textbook selection varies by instructor. An example of texts for this course might be:]

R.H. Myers & Janet S. Milton. A first course in the theory of linear statistical models. PWS-Kent (1991).

Irwin Guttman, Linear models: an introduction. John Wiley & Sons (1982).

SUPPLIES / MATERIALS:

STUDENT EVALUATION:

[An example of student evaluation for this course might be:]

Assignments	10%
Midterm exams	30%
Final exam	60%

COURSE CONTENT:

[Course content varies by instructor. An example of course content might be:]

1. Review and overview of the normal, chi square, Student's 't', 'F' and beta probability distributions; matrices, partitioning, vector spaces, linear manifolds, rank, trace, projections, idempotent matrices, generalized inverses, extrema of quadratic forms under linear constraints, vector and matrix derivatives.
2. Sampling distributions: orthogonal and partitioned linear transformations of independent normal samples, sums of squares of normal variables, joint distribution of sample mean and variance, the Fisher-Cochran theorem, distribution of quadratic forms in normal variables under minimization and linear constraints. Expectation and covariance of linear functions and expectation of quadratic functions of normal variables.
3. The Gauss-Markov theorem; normal equations and estimable linear functions, covariance of least square estimators, estimation of the residual variance, correlated observations, linear side conditions, Lagrange multiplier methods. Tests of hypotheses and interval estimation.
4. Tests of multiple hypotheses, Bonferroni, Tukey, Scheffe and Dunnett's methods.
5. The analysis of variance table, special cases. Test of equality of regression coefficients, test of assigned regression equations, test of additional information, analysis of covariance.
6. Prediction, calibration, assay problems, including Fieller's theorem.
7. Biased estimation in linear models, ridge regression.
8. Discussion of validation of assumptions, residuals, diagnostics, the hat matrix, Cook's distance, the Durbin-Watson statistic (as time allows).