UNIVERSITY COLLEGE of the FRASER VALLEY

COURSE IMPLEMENTATION DATE: January 1994
COURSE REVISED IMPLEMENTATION DATE: September 2006
COURSE TO BE REVIEWED: January 2009
(Four years after implementation date) (MONTH YEAR)

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: **Science, Health & Human Services / Mathematics & Statistics**

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

Applied Multivariate Statistical Analysis
COURSE DESCRIPTIVE TITLE

CALENDAR DESCRIPTION:

This course is the extension of the linear model methods of MATH 302 and MATH 315 to the multivariate 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 include Hotelling's T^2, the analysis of dispersion, multivariate regression, principal components, factor analysis, canonical correlations, and discriminant analysis. Although theory is discussed, the emphasis is on applications.

PREREQUISITES: **MATH 211, MATH 221, MATH 270, MATH 302, and two additional upper-level courses. (Effective September 2006, the prerequisites will be: MATH 221 and MATH 370)**

COREQUISITES:

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

SERVICE COURSE TO:
_____ *(Department/Program)*
_____ *(Department/Program)*

TOTAL HOURS PER TERM: **60**

STRUCTURE OF HOURS:

Lectures:	**30**	Hrs
Seminar:		Hrs
Laboratory:	**30**	Hrs
Field Experience:		Hrs
Student Directed Learning:		Hrs
Other (Specify):		Hrs

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

MAXIMUM ENROLLMENT: **36**
EXPECTED FREQUENCY OF COURSE OFFERINGS: **Every two years.**
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: Gillian Mimmack *(Curriculum Committee)*
Department Head: Gillian Mimmack
Dean: Jacalyn Snodgrass
PAC Approval in Principle Date:
PAC Final Approval Date: December 10, 2004

LEARNING OBJECTIVES / GOALS / OUTCOMES / LEARNING OUTCOMES:

The successful student will:
1. develop the basic theory for techniques used in mutlivariate data analysis.
2. develop the theory for multivariate linear regression, principal components analysis, factor analysis, and canonical correlation analysis.
3. use statistical software to analyze multivariate data using multivariate linear regression, principal components analysis, factor analysis, and canonical correlation analysis.

METHODS:

Lectures, class discussion, use of statistical software in computing labs.

PRIOR LEARNING ASSESSMENT RECOGNITION (PLAR):

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

METHODS OF OBTAINING PLAR:

Course challenge. Please check online at http://www.ucfv.ca/math/challenge.htm for the departmental challenge policy.

TEXTBOOKS, REFERENCES, MATERIALS:

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

The textbook is chosen by a departmental curriculum committee. Recent text used:
Johanson and Wichern. Applied Multivariate Statistical Analysis. Prentice Hall.

SUPPLIES / MATERIALS:

STUDENT EVALUATION:

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

Assignments and Projects	30%
Term Tests	30%
Final Exam	40%

Students must obtain at least 40% on the final exam in order to receive credit for this course.

COURSE CONTENT:

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

1. Matrix algebra: positive definite matrices, a square-root matrix, random vectors and matrices, matrix inequalities and maximization.
2. Sample geometry and random sampling: geometry of samples, expected values and covariance matrices for populations and for samples, generalized variance.
3. Multivariate normal distributions: multivariate normal densities, sampling from multivariate normal distributions, maximum likelihood estimation, sampling distributions of the sample mean and the sample covariance matrix, assessing the assumption of normality, outliers and cleaning data, transformation to normality.
4. Inference about the mean vector: testing the plausibility of a constant vector as the mean of a multivariate normal population, Hotelling's T^2 and the likelihood ratio test, confidence regions and simultaneous comparisons of components of the mean vector.
5. Multivariate multiple linear regression: least squares estimation, inference for parameters of the model, checking the validity of the model.
6. Principal components analysis: population principal components, summarizing sample variation using principal components, large sample inference.
7. Factor analysis: the orthogonal factor model, factor estimation, factor rotation, factor scores, perspectives and strategy for factor analysis.
8. Canonical correlation analysis: canonical variates and canonical correlations, population canonical correlation and interpretation, sample canonical variates and sample canonical correlation, large sample inference.
9. Classification and clustering methods.