



COURSE IMPLEMENTATION DATE: January 1994  
 COURSE REVISED IMPLEMENTATION DATE: September 2013  
 COURSE TO BE REVIEWED: December 2017  
*(six years after UEC approval) (month, year)*

**OFFICIAL UNDERGRADUATE 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 – see course syllabus available from instructor

MATH 470	Science/Mathematics & Statistics	3
COURSE NAME/NUMBER	FACULTY/DEPARTMENT	UFV CREDITS
Applied Multivariate Statistical Analysis		
COURSE DESCRIPTIVE TITLE		

**CALENDAR DESCRIPTION:**

This course is the extension of the linear model methods 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 multivariate regression, principal components, factor analysis, canonical correlations, and discrimination and classification analysis. The emphasis is on applications by using statistical software.

PREREQUISITES: One of the following: MATH 271, MATH 315, MATH 302, or MATH 330.  
 COREQUISITES:  
 PRE or COREQUISITES:

**SYNONYMOUS COURSE(S):**

- (a) Replaces: \_\_\_\_\_
- (b) Cross-listed with: \_\_\_\_\_
- (c) Cannot take: \_\_\_\_\_ for further credit.

**SERVICE COURSE TO:** *(department/program)*

**TOTAL HOURS PER TERM:** 45

**STRUCTURE OF HOURS:**

Lectures:	_____ Hrs
Seminar:	_____ Hrs
Laboratory:	<u>45</u> Hrs
Field experience:	_____ Hrs
Student directed learning:	_____ Hrs
Other (specify):	_____ Hrs

**TRAINING DAY-BASED INSTRUCTION:**

Length of course: \_\_\_\_\_  
 Hours per day: \_\_\_\_\_

**OTHER:**

Maximum enrolment: 36  
 Expected frequency of course offerings: Every two years  
*(every semester, annually, every other year, etc.)*

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

Course designer(s): <u>Ali Reza Fotouhi</u>	Date approved: <u>November 29, 2010</u>
Department Head: <u>Greg Schlitt</u>	Date of meeting: <u>October 7, 2011</u>
Supporting area consultation (Pre-UEC)	Date approved: <u>November 18, 2011</u>
Curriculum Committee chair: <u>Norm Taylor</u>	Date approved: <u>December 2, 2011</u>
Dean/Associate VP: <u>Ora Steyn</u>	Date of meeting: <u>December 16, 2011</u>
Undergraduate Education Committee (UEC) approval	

**LEARNING OUTCOMES:**

Upon successful completion of this course, students will be able to:

1. develop the notion and techniques used in multiple linear regression to multivariate multiple linear regression
2. perform principle component analysis to transform a number of possibly correlated variables into a number of uncorrelated variables
3. perform factor analysis to describe variability among observed variables in terms of a potentially lower number of unobserved variables
4. perform canonical correlation analysis to identify pairs of canonical variables
5. sort observations into two or more labeled classes and assign new observation to the labeled classes.
6. use statistical software to analyze multivariate data

**METHODS:** *(Guest lecturers, presentations, online instruction, field trips, etc.)*

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

**METHODS OF OBTAINING PRIOR LEARNING ASSESSMENT RECOGNITION (PLAR):**

Examination(s)                       Portfolio assessment                       Interview(s)

Other (specify): Course challenge

PLAR cannot be awarded for this course for the following reason(s):

**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. Introduction to multivariate data: graphical presentation, mean vector, variance covariance matrix, and correlation matrix.
2. Multivariate multiple linear regression: least squares estimation, inference for the parameters of the model, model diagnostics, checking the validity of the model.
3. Principle component analysis: Population principle components, summarizing sample variation using principle components analysis, large sample inference.
4. Factor analysis: the orthogonal factor model, factor estimation, factor rotation, factor scores, perspectives and strategy for factor analysis.
5. Canonical correlation analysis: canonical variates and sample canonical correlation, population canonical correlation and interpretation, sample canonical variates and sample canonical correlation, and large sample inference.
6. Discrimination and classification: separation and classification for two population, Fisher's discrimination method, classification with several populations.