UNIVERSITY COLLEGE of the FRASER VALLEY

COURSE IMPLEMENTATION DATE: May, 1994
COURSE REVISED IMPLEMENTATION DATE: Sept, 2004
COURSE TO BE REVIEWED: Sept, 2008
(Four years after implementation date) (MMMM YY 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: **Science, Health and Human Services/Mathematics and Statistics**

MATH 330		**3**
COURSE NAME/NUMBER	FORMER COURSE NUMBER	UCFV CREDITS

Design of Experiments
COURSE DESCRIPTIVE TITLE

CALENDAR DESCRIPTION:

This course discusses the construction and analysis of standard experimental designs. The basic techniques of randomization and blocking, and the use of covariates are reviewed, followed by consideration of the 2^k factorial and fractional factorial designs. Repeated measures designs are next discussed, including the split-plot and cross-over varieties. Variance components analysis and response surface methods are covered as time allows.

Emphasis is on the conduct, assumption, implications and rationale of particular designs. The data analysis is implemented using the MINITAB software. Students are expected to produce a report resulting from analyzing data collected from an experiment which they have designed and conducted and which illustrates at least one of the major designs discussed.

PREREQUISITES: **MATH 270**
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 HOUR

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: **36**
EXPECTED FREQUENCY OF COURSE OFFERINGS: **every second year**
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 Department	Chairperson:	Peter Mulhern *(Curriculum Committee)*
Department Head:	Gillian Mimmack	Dean:	Jackie Snodgrass
PAC Approval in Principle Date:		PAC Final Approval Date:	December 10, 2004

LEARNING OBJECTIVES / GOALS / OUTCOMES / LEARNING OUTCOMES:

The course is designed to enable students to:

1. be familiar with the basic statistical designs commonly met in practice and in the literature;
2. understand the reasoning and importance of the basic experimental maneouvres of randomisation, blocking, stratification and replication;
3. meet the notion of a random effects model;
4. consider the effects of measurement errors in independent variables and the notions of replicability and reliability.

METHODS:

Lectures, computer work, discussion both in and out of class, group work for project.

PRIOR LEARNING ASSESSMENT RECOGNITION (PLAR):

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

METHODS OF OBTAINING PLAR:

Course challenge.

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 texts used:

Text: Box, G.E.P., Hunter, W.G., and Hunter, J.S. 1978. *Statistics for Experimenters*. Wiley.

References: Montgomery, D.C. 2001. *Design and Analysis of Experiments*. Wiley.
Fleiss, Joseph L. 1999. *The Design and Analysis of Clinical Experiments*. Wiley.
Crowder, M.J. and Hand. 1990. *Analysis of Repeated Measures*. Chapman and Hall.
Cox, D.R. 1957. *The Design of Experiments*. Wiley.

SUPPLIES / MATERIALS:

STUDENT EVALUATION:

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

Project	10%
Assignments	20%
Tests	30%
Final examination	40%

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

COURSE CONTENT:

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

Linearity: the assumptions of a linear model, linear effects and a linear error tem. Randomisation.

Blocking designs: matched pairs, randomised blocks, Latin squares, multiple Latin squares, Graeco-Latin squares, balanced incomplete blocks, Youden squares. Blocking versus covariate analysis: discussion.

Factorial designs: 2^k designs. Yates' plussing and minussing, Daniels' method of plotting to select contrasts of interest in

saturated designs. Fractional factorial designs, confounding and aliasing. Selecting a fractional factorial design, implications of the selection, replication. Designs of Resolution R. Plackett and Burman designs.

Response surface methods: use and estimation of local quadratic approximations, the search for an optimum.

Variance components: variance component models in balanced designs, construction of appropriate models, interpretation of tests, confidence intervals for fixed effects.

Cross-over designs: conditions under which they are appropriate, analysis and interpretation.

Split-plot designs: common repeated measure designs and corresponding uni-variate models and analysis.

Error-in-measurement problems: replication and reliability, Cronbach's alpha, the attenuation of slope estimates.