

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:	<b>Science, Health and Human Services/Mathematics and Statistics</b>	
<b>MATH 330</b>		<b>3</b>
COURSE NAME/NUMBER	FORMER COURSE NUMBER	UCFV CREDITS
	<b>Design of Experiments</b>	
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 302**
**COREQUISITES:**

SYNONYMOUS COURSE(S)	<b>SERVICE COURSE TO:</b>
(a) Replaces: _____ (Course #)	_____
(b) Cannot take: _____ for further credit. (Course #)	_____

TOTAL HOURS PER TERM: <b>60</b>	TRAINING DAY-BASED INSTRUCTION	
<b>STRUCTURE OF HOURS:</b>	LENGTH OF COURSE: _____	
Lectures: <b>60</b> Hrs	HOURS PER DAY: _____	
Seminar: _____ Hrs		
Laboratory: _____ Hrs		
Field Experience: _____ Hrs		
Student Directed Learning: _____ Hrs		
Other (Specify): _____ Hrs		

MAXIMUM ENROLLMENT:	<b>36</b>
EXPECTED FREQUENCY OF COURSE OFFERINGS:	<b>every second year</b>
<b>WILL TRANSFER CREDIT BE REQUESTED? (lower-level courses only)</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No
<b>WILL TRANSFER CREDIT BE REQUESTED? (upper-level requested by department)</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<b>TRANSFER CREDIT EXISTS IN BCCAT TRANSFER GUIDE:</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

**AUTHORIZATION SIGNATURES:**

Course Designer(s): _____ Math Department	Chairperson: _____ Peter Mulhern ( <i>Curriculum Committee</i> )
Department Head: _____ Gillian Mimmack	Dean: _____ Jackie Snodgrass
PAC Approval in Principle Date: _____	PAC Final Approval Date: November 26, 2003

**COURSE NAME/NUMBER****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 manoeuvres 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 term. 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.