

UNIVERSITY COLLEGE OF THE FRASER VALLEY

COURSE INFORMATION

DISCIPLINE/DEPARTMENT: Mathematics and Statistics IMPLEMENTATION DATE: Jan. 2000

Revised: _____

Math 116 Calculus II for Business, Biology and CIS 4
SUBJECT/NUMBER OF COURSE DESCRIPTIVE TITLE UCFV CREDITS

CALENDAR DESCRIPTION: This calculus stream is recommended for students of Business Management, Biological Sciences, and Computer Information Systems. (Please see transfer guide for transferability to other universities.) This course continues from 115 and relies heavily on modelling from real data. The topics include: multivariate differential calculus, differential equations, matrices, solution of simultaneous equations and simultaneous differential equations.

RATIONALE: This course is essentially Math 114, revised both to reflect a new emphasis on modelling and the use of mathematical software and to make the course appropriate for students of biology as well as business and computing.

COURSE PREREQUISITES: Math 113 or 115 with C or better

COURSE CO-REQUISITES: None

HOURS PER TERM FOR EACH STUDENT	Lecture	65	hrs	Student Directed		
	Laboratory		hrs	Learning		hrs
	Seminar		hrs	Other - specify:		
	Field Experience		hrs	_____		hrs
				TOTAL		65

MAXIMUM ENROLMENT: 35

Is transfer credit requested? : Yes **9** No

AUTHORIZATION SIGNATURES:	
Course Designer(s): <u>C. Guidera</u>	Chairperson: <u>T. Cooper</u> Curriculum Committee
Department Head: <u>S. Milner</u>	Dean: <u>W. Welsh</u>
PAC: Approval in Principle _____ (Date)	PAC: Final Approval: <u>September 24, 1997</u> (Date)

Math 116
NAME & NUMBER OF COURSE

SYNONYMOUS COURSES:

(a) replaces Math 114
 (course #)

(b) cannot take Math 112 for further credit
 (course #)

SUPPLIES/MATERIALS:

Student Version of MAPLE V release IV is recommended.

TEXTBOOKS, REFERENCES, MATERIALS (List reading resources elsewhere)

Calculus Concepts, An Informal Approach to the Mathematics of Change, LaTorre, Kenelly, Fetta, Harris, Carpenter, (1st ed.) D.C. Heath.

Calculus, From Graphical, Numerical and Symbolic Points of View, Vol II, Ostebee, Zorn, (Prelim ed) Saunders.

OBJECTIVES:

To provide students with:

1. Fundamental understanding of modelling with more than one variable.
2. Differential calculus methods of analysing multivariate models including constrained optimization.
3. Modelling real situations with differential equations.
4. Methods of solving 1st and 2nd order differential equations exactly and numerically.
5. Some basic knowledge of matrix terminology and operations.
6. Methods of solving linear systems of equations and linear systems of differential equations.
7. The ability to immediately interpret all results in real and practical terms.

METHODS:

All class sessions will be held in a lab/classroom setting using the latest technology available for our use. At present we will use MAPLE (a Computer Algebra System) in an IBM compatible lab. Students will learn to use the technology as an everyday tool for accomplishing the mathematical analysis.

Students will do regular group and individual assignments.

Math 114**NAME & NUMBER OF COURSE**

STUDENT EVALUATION PROCEDURE:

Assignments and quizzes	25%
Short tests and midterms	35%
Final	40%

COURSE CONTENT

- I. MORE APPLICATIONS OF INTEGRATION: methods of substitution and Integration by Parts, use of MAPLE to deal with harder integrals.
- II. MULTIVARIATE MODELS: understanding the model. Partial derivatives. Differential calculus methods of analysing the behaviour of multivariate models. Optimization with constraints.
- III. The Calculations behind Least Squares method of curve fitting.
- IV. DIFFERENTIAL EQUATIONS: Differential equations as models for real-life situations. The logistic differential equation. Predator-Prey models. Solving first and second order linear equations using MAPLE and graphing solutions (this will include some review of cyclical models). Numerical methods for analysing and approximating solutions to 1st order D.E.'s. (If time allows) Numerical methods for analysing and approximating solutions to 2nd order D.E.'s or systems of D.E.'s.
- V. SYSTEMS OF EQUATIONS: Matrix terminology and operations. Solving linear systems of equations using MAPLE.