UNIVERSITY COLLEGE of the FRASER VALLEY

COURSE IMPLEMENTATION DATE: June 1994
COURSE REVISED IMPLEMENTATION DATE: September 1999
COURSE TO BE REVIEWED: September 2003
(Four years after implementation date) (MONTH YEAR 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: **MATHEMATICS AND STATISTICS**

MATH 115	**113**	**4**
COURSE NAME/NUMBER	FORMER COURSE NUMBER	UCFV CREDITS

DIFFERENTIAL & INTEGRAL CALCULUS I
COURSE DESCRIPTIVE TITLE

CALENDAR DESCRIPTION:

This calculus stream (Math 115/114 is recommended for students of Business Management, and Computer Information Systems). (Please see transfer guide for transferability to other universities.) This course is based on modeling real data with piecewise continuous models. The current and future behaviour of the model is analyzed using the techniques of differential calculus of one variable, including optimization and curvature analysis, and the results are interpreted in real-life terms. Also included in the course are integral calculus of one variable topics: finding the total accumulation of change, Riemann Sums, the Fundamental Theorem, finding anti-derivatives, applications involving measuring the effects of change, and very simple differential equations.

NOTE: Students may receive credit for only one of Math 111, Math 113, Math 115.

NOTE: This course will be first offered in the year 1999/2000.

PREREQUISITES: **Algebra 12 or Math 12, with C+ or higher, or UCFV Math 094/095 with C+ or higher, or UCFV Math 109 with B or higher, or UCFV Math 110 with C+ or higher, or a C+ in Application of Math 12.**
COREQUISITES: **None**

SYNONYMOUS COURSE(S)
(a) Replaces: **MATH 113** *(Course #)*
(b) Cannot take: **MATH 111, 113** *(Course #)* for further credit.

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

TOTAL HOURS PER TERM: **65**
STRUCTURE OF HOURS:

Lectures:	**65**	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: **35**
EXPECTED FREQUENCY OF COURSE OFFERINGS:

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): C. Guidera
Chairperson: *(Curriculum Committee)*
Department Head: S. Milner
Dean: W. Welsh
PAC Approval in Principle Date:
PAC Final Approval Date: December 17, 1997

LEARNING OBJECTIVES / GOALS / OUTCOMES / LEARNING OUTCOMES:

To provide students with:

1. Fundamental methods of modeling raw data from their fields of interest.
2. Skills to interpret models and analyse their domain of applicability and their continuity.
3. Fundamental techniques of differential calculus to analyse the present and future behaviour of models.
4. Fundamental techniques of integral calculus to reconstruct total change in a quantity and model of a quantity from rate of change data.
5. 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.

Progress will be evaluated with regular quizzes, short tests, midterms and a 3-hour comprehensive final exam.

As much of the time as possible, real data is used as a starting point for modeling behaviour with continuous mathematical functions so that the methods of calculus can be applied to real problems of interest to students in the various areas of study.

PRIOR LEARNING ASSESSMENT RECOGNITION (PLAR):

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

METHODS OF OBTAINING PLAR:

TEXTBOOKS, REFERENCES, MATERIALS:

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

Calculus Concepts, An Informal Approach to the Mathematics of Change, LaTorre, Kenelly, Fetta, Harris, Carpenter, (1st ed.) D.C. Health.
Calculus, From Graphical, Numerical and Symbolic Points of View, Vol I, Ostebee, Zorn, (Prelim ed) Saunders.

SUPPLIES / MATERIALS:

Student Version of MAPLE V release IV is recommended.

STUDENT EVALUATION:

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

Short tests (5)	20%
Assignments	20%
Midterms (2)	20%
Final	40%

COURSE CONTENT:

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

1. FUNDAMENTALS OF MODELLING: Linear, Exponential, Logistic, Polynomial (quadratic and cubic), Cyclical (trigonometric) models. Reversing input/output variables in a model, Inverses. How to choose and/or build a model. Piecewise continuous modeling. Modelling with Splines (Linear, quadratic or cubic).

2. DESCRIBING CHANGE: Rates of change.

3. DETERMINING CHANGE: Derivatives.

4. ANALYSING CHANGE: Optimization, Curvature and Inflection points, Approximating change.

5. ACCUMULATING CHANGE: Approximating area, Limits of Sums, Definite Integrals, Indefinite Integrals, The Fundamental Theorem.

6. APPLICATIONS OF MEASURING THE EFFECTS OF CHANGE: Averages, Integrals in Economics, Integrals in Biological Sciences, very simple Differential Equations.