UNIVERSITY COLLEGE of the FRASER VALLEY

COURSE IMPLEMENTATION DATE:	June 1994
COURSE REVISED IMPLEMENTATION DATE:	September 2003
COURSE TO BE REVIEWED:	September 2007
(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 115/116) is recommended for students of Business Management, Biological Sciences, 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 analysed 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 antiderivatives, applications involving finding a model from rate of change data, measuring the effects of change, and very simple differential equations.
NOTE: Credit cannot be obtained for more than one of Math 111 or Math 115.

PREREQUISITES: **Principles of Math 12 with C+ or higher (provincially examined), or UCFV MATH 094/095 with C+ average or higher, or MATH 110 with C+ or higher, or C+ in Applications of Math 12. (Note: Applications of Math 12 will not meet the prerequisites effective Fall 2004.)**

COREQUISITES: **None**

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

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

TOTAL HOURS PER TERM: **75**

STRUCTURE OF HOURS:

Lectures:	Hrs
Seminar:	Hrs
Laboratory:	Hrs
Field Experience:	Hrs
Student Directed Learning:	Hrs
Other (Specify):	Hrs

TRAINING DAY-BASED INSTRUCTION
LENGTH OF COURSE: **n/a**
HOURS PER DAY: **n/a**

MAXIMUM ENROLLMENT: **36**
EXPECTED FREQUENCY OF COURSE OFFERINGS: **Fall and Winter Term**

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: Greg Schlitt
Dean: W. Welsh
PAC Approval in Principle Date:
PAC Final Approval Date: December 4, 2002

LEARNING OBJECTIVES / GOALS / OUTCOMES / LEARNING OUTCOMES:

Building upon their pre-requisite calculation skills and knowledge of functions and function notation, successful students will:

1. Learn to be proficient with the technology chosen for the delivery of the extent required to perform the mathematical analysis learned in this course
2. Learn to make mathematical models from real data from their fields of interest, where the models are linear, exponential, logarithmic, logistic, polynomial, cyclical or combinations of these that are piecewise continuous. Interpret and apply these models
3. Learn the fundamental techniques of differential calculus to analyze the present and future behaviour of models.
4. Learn the fundamental techniques of integral calculus to reconstruct total change in a quantity and model of a quantity from rate of change data or a rate of change model for the quantity.
5. Be able to demonstrate the ability to immediately interpret all results in real and practical terms in the field of interest from which the model being analyzed arose.

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:

Course Challenge

TEXTBOOKS, REFERENCES, MATERIALS:

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

Latorre, Kennelly et al, Calculus Concepts, 3rd ed. Houghton Mifflin 20002
Ostebee, Zorn, Calculus From Graphical, Numerical and Symbolic Points of View, Vol I, 1st ed. Saunders

SUPPLIES / MATERIALS:

Student Version of MAPLE V current release is recommended.

STUDENT EVALUATION:

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

Quizzes, Assignments & Projects	30%
Term Tests	30%
Final Exam	40% *

*Students must obtain at least 40% on the final exam to pass the course, regardless of term grades.

COURSE CONTENT:

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

1. FUNDAMENTALS OF MODELING: 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.