UNIVERSITY COLLEGE of the FRASER VALLEY

COURSE IMPLEMENTATION DATE:	May 1977
COURSE REVISED IMPLEMENTATION DATE:	September 2001
COURSE TO BE REVIEWED:	September 2005
(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 & STATISTICS**

MATH 111		**4**
COURSE NAME/NUMBER	FORMER COURSE NUMBER	UCFV CREDITS

CALCULUS I

COURSE DESCRIPTIVE TITLE

CALENDAR DESCRIPTION:

The study of calculus represents a major step in your education. Mathematics, previous to this subject, dealt with the description of static phenomena. During the latter part of the 17th century, a mathematical description was developed to describe and predict changing phenomena. This mathematics of change is now called calculus.

Topics include limits, derivatives, applications of derivatives such as analysis of function behaviour, optimization and related rates; antidifferentiation, polar coordinates and parametric functions.

Students may receive credit for only one of Math 111 or Math 115.

PREREQUISITES: **Principles of Math 12 with B or higher (provincially examined; recommended for Fall 2001, required for Fall 2002), or UCFV MATH 094/095 with B average or higher, or MATH 110 with C+ or higher.**

COREQUISITES: **None**

SYNONYMOUS COURSE(S)

(a) Replaces: _____ *(Course #)*

(b) Cannot take: **MATH 115** *(Course #)* for further credit.

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

TOTAL HOURS PER TERM: **75**

STRUCTURE OF HOURS:

Lectures:	**75**	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: **Fall and winter terms. May be offered in spring term, according to demand and funding.**

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): UCFV Calculus Group

Chairperson: _____ *(Curriculum Committee)*

Department Head: Greg Schlitt

Dean: _____

PAC Approval in Principle Date:

PAC Final Approval Date: November 29, 2000

LEARNING OBJECTIVES / GOALS / OUTCOMES / LEARNING OUTCOMES:

Building upon their knowledge of functions and function notation, successful students will:

- Become proficient with the basic concepts and language of differential calculus
- Understand and work with the derivative graphically and numerically, as well as algebraically,
- Learn techniques of differentiation for algebraic and transcendental functions,
- Become proficient with the use of technology to explore mathematical concepts,
- Be able to use their knowledge of the derivative to model and solve problems from various disciplines, and
- Develop their ability to communicate their approach to and solution of such problems.

In principle, the student will be able to carry out all analyses and calculations both with and without technological support.

In the process of mastering the concepts and techniques of this first course in calculus, the student should begin to develop an appreciation of what mathematics is and how the skills honed through the study of mathematics are useful in other disciplines.

METHODS:

Lectures are interspersed with problem sessions; evaluation includes assignments, midterms, and a three-hour comprehensive final. Graphing calculators will be used. In addition, mathematical software may be used.

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 include:
Hughes-Hallett, Gleason, et al., Calculus, second edition, Wiley, 199*.
Stewart, Single Variable Calculus, Early Transcendentals, fourth edition, Brooks/Cole, 1999.

SUPPLIES / MATERIALS:

A graphing calculator (without a computer algebraic system) will be required.

STUDENT EVALUATION:

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

The weighting of the various components may vary from instructor to instructor and from year to year, although there must be at least two midterms, and the comprehensive final exam must be worth from 30% to 50% of the final grade.

An example of student evaluation for this course:	Quizzes/assignments	20%
	Midterm exams	40%
	Final exam	40%

COURSE CONTENT:

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

Exact course content and ordering may vary slightly from year to year but will encompass the following:

Preliminaries:

1. Brief review of functions, functional notation, and graphs*
2. Review of special functions and their graphs*: power, polynomial, exponential, inverse, logarithmic, trigonometric

The Derivative:

1. Introduction to derivatives and limits
2. Interpretation of the derivative as a rate of change
3. Geometric interpretation of first and second derivatives
4. Definition of derivatives using numerical methods*
5. Formal definition of the derivative
6. Limits and continuity
7. Local linearity*

Differentiation of Special Functions:

1. Power functions
2. Exponential functions
3. Product, quotient, chain rules
4. Trigonometric functions, inverse trigonometric functions
5. Implicitly-defined functions
6. Logarithmic differentiation

Applications of the Derivative:

1. Curve sketching* and analysis of function behaviour; Mean Value Theorem
2. Analysis of families of curves
3. Optimization problems from various disciplines, which may include physics, chemistry, biology, population studies, economics
4. Related rates problems from various disciplines
5. Newton's method*
6. L'Hopital's rule

Antiderivaties

Polar Curves and Parametric Functions

1. Polar coordinates and curves*, with applications
2. Differentiation of polar curves
3. Parametric functions* and applications
4. Differentiation of parametric functions

*While graphing calculator and/or other technology are used throughout the course, they are particularly useful in helping students explore these concepts.