UNIVERSITY COLLEGE of the FRASER VALLEY

PAC FORM #2

COURSE IMPLEMENTATION DATE: [May-77]
COURSE REVISED IMPLEMENTATION DATE: [Sept-04]
COURSE TO BE REVIEWED: [Sept-07]
(Four years after implementation date)

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 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: A recent Principles of Math 12 with B or higher (provincially examined); or UCFV MATH 094/095 with B average or higher, or MATH 110 with C+ or higher; or a score of at least 70% on the MDPT.

COREQUISITES:

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 & Winter**
Spring due to demand & 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): Calculus Group / Math Dept – update
Chairperson: Jim Andersen – *Arts Curriculum Committee*

Department Head: Gillian Mimmack
Dean: Linda Matwichuk

PAC Approval in Principle Date: _____
PAC Final Approval Date: May 26, 2004

MATH 111
COURSE NAME/NUMBER

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.

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 ☒ 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, 1998.
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%

Students must achieve at least 40% on the final exam in order to receive credit for this course.

MATH 111
COURSE NAME/NUMBER

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:

I. Preliminaries:
1. brief review of functions, functional notations, and graphs*
2. review of special functions and their graphs*: power, polynomial, exponential, inverse, logarithmic, trigonometric

II. 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*

III. 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

IV. 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

V. Antiderivatives

VI. 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 calculators and/or technology are used throughout the course, they are particularly useful in helping students explore these concepts.