UNIVERSITY COLLEGE of the FRASER VALLEY

COURSE IMPLEMENTATION DATE: September 1993
COURSE REVISED IMPLEMENTATION DATE: September 2005
COURSE TO BE REVIEWED: September 2009
(Four years after implementation date) (MONTH YEAR)

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: **Science, Health & Human Services / Mathematics & Statistics**

MATH 112		**4**
COURSE NAME/NUMBER	FORMER COURSE NUMBER	UCFV CREDITS

Calculus II
COURSE DESCRIPTIVE TITLE

CALENDAR DESCRIPTION:

Calculus I is concerned with finding the characteristics of change of a given quantity. In Calculus II, we examine the change in the reverse: if we know the way a quantity changes, can we determine what the quantity is?

Topics include techniques of integration; application of the definite integral to various problems such as areas, volumes, fluid pressure and population growth; improper integrals and their applications; an introduction to differential equations; polynomial approximations to functions; and sequences and series.

Students may receive credit for only one of MATH 112 and MATH 116.

PREREQUISITES: **MATH 111 with a C or better**
COREQUISITES:

SYNONYMOUS COURSE(S)
(a) Replaces: _____ *(Course #)*
(b) Cannot take: **MATH 116** *(Course #)* for further credit.

SERVICE COURSE TO: _____ *(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 semesters. May be offered in the Spring 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): Calculus Group
Chairperson: Gillian Mimmack *(Curriculum Committee)*
Department Head: Gillian Mimmack
Dean: Jacalyn Snodgrass
PAC Approval in Principle Date:
PAC Final Approval Date: December 10, 2004

LEARNING OBJECTIVES / GOALS / OUTCOMES / LEARNING OUTCOMES:

Building upon their knowledge of differential calculus, successful students will:
1. become competent with the fundamental techniques of integration.
2. be able to develop and evaluate definite and improper integrals arising in a variety of situations, including geometry, physics, biology, and economics.
3. be able to set up and solve elementary differential equations using graphical, numerical and analytical techniques.
4. apply their knowledge of DEs to solve basic growth and decay problems in a variety of settings.
5. be able to construct, manipulate and apply Taylor series.

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

In the course of mastering the concepts and techniques of this first year calculus course, the student should 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. Please check online at http://www.ucfv.ca/math/challenge.htm for the departmental challenge policy.

TEXTBOOKS, REFERENCES, MATERIALS:

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

The text is chosen by a departmental curriculum committee. Recent text used:
Stewart. Single Variable Calculus, Early Transcendentals. 5th edition. Brooks/Cole.

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. Students must obtain at least 40% on the final exam to pass the course.
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:
I. Definite Integral:
   1. brief review of derivatives and antiderivatives
   2. integration by substitution
   3. integration by parts
   4. other integration techniques, as time permits: trigonometric substitution, partial fractions
   5. use of tables
   6. numerical integration* including Riemann sums, trapezoid and midpoint rules, Simpson's rule
   7. improper integrals

II. Applications: constructing Riemann sums and evaluating integrals in a wide variety of settings, including
   1. area, volume, arc length
   2. applications from the natural and social sciences

III. Differential Equations:

1. slope fields*
2. Euler's method*
3. separating variables
4. applications to growth and decay problems*, including exponential, limited, and logistic models
5. modelling other situations, as time permits*

IV. Series:

1. Taylor polynomials*
2. sequences and series
3. Taylor series* and applications
4. error estimation

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