UNIVERSITY OF THE FRASER VALLEY

ORIGINAL COURSE IMPLEMENTATION DATE: May 1977
REVISED COURSE IMPLEMENTATION DATE: September 2018
COURSE TO BE REVIEWED: (six years after UEC approval) January 2020
Course outline form version: 09/15/14

OFFICIAL UNDERGRADUATE COURSE OUTLINE FORM

Note: The University reserves the right to amend course outlines as needed without notice.

Course Code and Number: MATH 111	**Number of Credits:** 4 Course credit policy (105)
Course Full Title: Calculus I **Course Short Title (if title exceeds 30 characters):**	
Faculty: Faculty of Science	**Department (or program if no department):** Mathematics and Statistics

Calendar Description:

This course covers differential calculus of a function of one variable. Topics include limits, continuity, differentiation of algebraic, trigonometric, inverse trigonometric, exponential and logarithmic functions, curve sketching, optimization, related rate problems, an introduction to antidifferentiation, polar coordinates, and parametric equations.

Note: Students with credit for MATH 141 cannot take this course for further credit.

Prerequisites (or NONE):	One of the following: (B or better in one of Principles of Mathematics 12, Pre-calculus 12, MATH 095, or MATH 096) or (B or better in both MATH 092 and MATH 093) or (C+ or better in MATH 110) or (at least 70% on the MDPT).
Corequisites (if applicable, or NONE):	NONE
Pre/corequisites (if applicable, or NONE):	NONE

Equivalent Courses (cannot be taken for additional credit)

Former course code/number:

Cross-listed with:

Equivalent course(s): **MATH 115, MATH 141**

Note: Equivalent course(s) should be included in the calendar description by way of a note that students with credit for the equivalent course(s) cannot take this course for further credit.

Transfer Credit

Transfer credit already exists: ☒ Yes ☐ No

Transfer credit requested (OReg to submit to BCCAT):
☐ Yes ☐ No (if yes, fill in transfer credit form)

Resubmit revised outline for articulation: ☒ Yes ☐ No

To find out how this course transfers, see **bctransferguide.ca**.

Total Hours: 60

Typical structure of instructional hours:

Lecture hours	60
Seminars/tutorials/workshops	
Laboratory hours	
Field experience hours	
Experiential (practicum, internship, etc.)	
Online learning activities	
Other contact hours:	
Total	**60**

Special Topics

Will the course be offered with different topics?
☐ Yes ☒ No

If yes, different lettered courses may be taken for credit:
☐ No ☐ Yes, repeat(s) ☐ Yes, no limit

Note: The specific topic will be recorded when offered.

Maximum enrolment (for information only): 36

Expected frequency of course offerings (every semester, annually, every other year, etc.): Fall & Winter

Department / Program Head or Director: Ian Affleck	**Date approved:**	September 2017
Faculty Council approval	**Date approved:**	September 8, 2017
Campus-Wide Consultation (CWC)	**Date of posting:**	October 13, 2017
Dean/Associate VP: Lucy Lee	**Date approved:**	September 8, 2017
Undergraduate Education Committee (UEC) approval	**Date of meeting:**	October 27, 2017

Learning Outcomes

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

1. Demonstrate proficiency with the basic concepts and language of differential calculus,
2. Work with the derivative graphically and numerically, as well as algebraically,
3. Explain techniques of differentiation for algebraic and transcendental functions;
4. Demonstrate proficiency with the use of technology to explore mathematical concepts,
5. Use their knowledge of the derivative to model and solve problems from various disciplines, and
6. Communicate their approach to and solution of such problems.

Prior Learning Assessment and Recognition (PLAR)

☒ Yes ☐ No, PLAR cannot be awarded for this course because

Typical Instructional Methods (guest lecturers, presentations, online instruction, field trips, etc.; may vary at department's discretion)

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.

Grading system: Letter Grades: ☒ Credit/No Credit: ☐ Labs to be scheduled independent of lecture hours: Yes ☐ No ☐

NOTE: The following sections may vary by instructor. Please see course syllabus available from the instructor.

Typical Text(s) and Resource Materials

The textbook is chosen by a departmental curriculum committee. Recent texts include:

	Author (surname, initials)	Title (article, book, journal, etc.)	Current ed.	Publisher	Year
1.	Adler & Lovric	Calculus for the Life Sciences, 2nd Canadian ed.	☐	Nelson	2014
2.	Stewart	Single Variable Calculus, Early Transcendentals, 8th ed.	☐	Brooks/Cole	2016
3.			☐		
4.			☐		
5.			☐		

Required Additional Supplies and Materials (software, hardware, tools, specialized clothing, etc.)

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

Typical Evaluation Methods and Weighting

Final exam:	40%	Assignments:	10%	Midterm exam:	%	Practicum:	%
Quizzes/tests:	50%	Lab work:	%	Field experience:	%	Shop work:	%
Other:	%	Other:	%	Other:	%	Total:	100%

Details (if necessary): Students must achieve at least 40% on the final exam in order to receive credit for this course.

Typical Course Content and Topics

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.