



COURSE IMPLEMENTATION DATE: May 1977
 COURSE REVISED IMPLEMENTATION DATE: January 2011
 COURSE TO BE REVIEWED: September 2007
(four years after UPAC approval) *(month, year)*

OFFICIAL UNDERGRADUATE 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 – see course syllabus available from instructor

MATH 111	Science/Mathematics and Statistics	4
COURSE NAME/NUMBER	FACULTY/DEPARTMENT	UFV 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.

Note: Students may receive credit for only one of MATH 111 or MATH 141 (formerly MATH 115).

PREREQUISITES: One of the following: B or better in one of Principles of Math 12 or Precalculus 12; or B average in MATH 094 and MATH 095; or C+ or better in MATH 110; or at least 70% on the MDPT.

COREQUISITES:
 PRE or COREQUISITES:

SYNONYMOUS COURSE(S):

- (a) Replaces: _____
- (b) Cross-listed with: _____
- (c) Cannot take: MATH 094/095, 115, 141 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: _____

OTHER:

Maximum enrolment: 36
 Expected frequency of course offerings: Fall & Winter
(every semester, annually, every other year, etc.)

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

Course designer(s): <u>Calculus Group</u>	Date approved: <u>September 1, 2010</u>
Department Head: <u>Greg Schlitt</u>	Date of meeting: <u>September 17, 2010</u>
Supporting area consultation (Pre-UPAC)	Date approved: <u>September 24, 2010</u>
Curriculum Committee chair: <u>Norm Taylor</u>	Date approved: <u>October 21, 2010</u>
Dean/Associate VP: <u>Ora Steyn</u>	Date of meeting: <u>October 29, 2010</u>
Undergraduate Program Advisory Committee (UPAC) approval	

LEARNING OUTCOMES:

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

- demonstrate proficiency with the basic concepts and language of differential calculus,
- work with the derivative graphically and numerically, as well as algebraically,
- explain techniques of differentiation for algebraic and transcendental functions;
- demonstrate proficiency with the use of technology to explore mathematical concepts,
- use their knowledge of the derivative to model and solve problems from various disciplines, and
- communicate their approach to and solution of such problems.

METHODS: *(Guest lecturers, presentations, online instruction, field trips, etc.)*

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.

METHODS OF OBTAINING PRIOR LEARNING ASSESSMENT RECOGNITION (PLAR):

Examination(s) Portfolio assessment Interview(s)

Other (specify): Please check online at <http://www.ufv.ca/math/challenge.htm> for the departmental challenge policy

PLAR cannot be awarded for this course for the following reason(s):

TEXTBOOKS, REFERENCES, MATERIALS: *[Textbook selection varies by instructor. Examples 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.

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*

Course content continued:

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.