



**MATH 111**  
 COURSE NAME/NUMBER

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**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.

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**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.