Virginia Western Community College
MTH 263
Calculus I

Prerequisites
Completion of MTH 167 or equivalent with a grade of C or better.

Course Description
Presents concepts of limits, derivatives, differentiation of various types of functions and use of differentiation rules, application of differentiation, antiderivatives, integrals and applications of integration.

Semester Credits: 4 **Lecture Hours: 4**

Required Materials
Textbook:
University Calculus. Hass, Weir & Thomas. 3rd edition. Pearson/Addison-Wesley. ISBN: 9780321999580.

Other Required Materials:
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Course Outcomes
At the completion of this course, the student should be able to:

- Explain the concepts of the derivative and differentiability.
- Explain the concepts of limit and continuity.
- Determine derivatives for appropriate algebraic and transcendental functions.
- Apply differentiation to solve problems of motion, optimization, and related rates.
- Apply the first and higher derivatives in determining extrema and concavity of curves for the solution of science and engineering problems.
- Reconstruction a function from knowledge of its derivative.
- Understand and evaluate antiderivatives, make substitutions to evaluate integrals of algebraic and transcendental functions.
- Evaluate definite integrals by definition.
- Evaluate Riemann sums.
- Be able to use Maple to solve differential calculus problems.

Topical Description

2	Limits and Continuity
2.1	Rates of Change and Tangents to Curves
2.2	Limits of a Function and Limit Laws
2.3	The Precise Definition of a Limit
2.4	One-Sided Limits
2.5	Continuity
2.6	Limits Involving Infinity: Asymptotes of Graphs
3	Differentiation
3.1	Tangents and the Derivative at a Point
3.2	The Derivative as a Function
3.3	Differentiation Rules
3.4	The Derivative as a Rate of Change
3.5	Derivatives of Trigonometric Functions
3.6	The Chain Rule
3.7	Implicit Differentiation
3.8	Derivatives of Inverse Functions and Logarithms
3.9	Inverse Trigonometric Functions
3.10	Related Rates
3.11	Linearization and Differentials
7.3	Hyperbolic Functions
4	Applications of Derivatives
4.1	Extreme Values of Functions
4.2	The Mean Value Theorem and Rolle's Theorem
4.3	Monotonic Functions and the First Derivative Test
4.4	Concavity and Curve Sketching
4.6	Applied Optimization
4.8	Antiderivatives
5	Integration
5.1	Area and Estimating with Finite Sums
5.2	Sigma Notation and Limits of Finite Sums
5.3	The Definite Integral
5.4	The Fundamental Theorem of Calculus
5.5	Indefinite Integrals and the Substitution Rule
5.6	Area Bounded Between Curves

Notes to Instructors

1. Maple labs are optional. However, there should be some kind of "project" given.