**I. Course Title:** Calculus I

**Course Number:** 221 **Catalog Prefix:** Math

**II. Prerequisites**: One of the following:
—4 years college preparatory math which includes Algebra II
—Math 141

**III. Credit Hours:** 5 **Lecture Hours:** 5
**Laboratory Hours:** **Observation Hours:**

**IV. Course Description:**

This course introduces calculus using analytic geometry functions. Topics include limits and continuity, derivatives, optimization, related rates, graphing and other applications of derivatives, definite and indefinite integrals, and numerical integration.

**V. Adopted Text:**

*Thomas' Calculus*, Updated Tenth Edition
Finney, Weir, Giordano
Addison Wesley, 2003
ISBN 0–201–75527–0

**VI. Course Objectives**

At the completion of this course the student will be able to:

1. Determine the domain, limits, and continuity of functions.
2. Calculate derivatives using the basic definition, sum and product formulas, quotient rule, chain rule, and power rule.
3. Analyze functions and sketch curves using first and second derivatives.
4. Use derivatives to solve problems involving maxima and minima (optimization), related rates, and differentials.
5. Estimate roots of equations using Newton's Method.
6. Demonstrate an understanding of Rolle's Theorem, Mean-Value Theorem, and the Fundamental Theorem of Calculus.
7. Calculate definite or indefinite integrals using the power rule or a substitution method.
8. Estimate definite integrals with the numerical techniques of the Trapezoid Rule and Simpson's Rule.

**VII. Grading**

Grading will follow the policy in the catalog.

**VIII. Course Outline**

*Trigonometric, exponential and logarithmic functions are omitted in this course but introduced in Math 222 Calculus II.*

Chapter 1 Limits and Continuity
- 1–1 Rates of Change and Limits
- 1–2 Finding Limits and One-Sided Limits
- 1–3 Limits Involving Infinity
- 1–4 Continuity
- 1–5 Tangent Lines

Chapter 2 Derivatives
- 2–1 The Derivative as a Function
- 2–2 The Derivative as a Rate of Change
- 2–3 Derivatives of Products, Quotients, and Negative Powers
- 2–5 The Chain Rule and Parametric Equations
- 2–6 Implicit Differentiation
- 2–7 Related Rates

Chapter 3 Applications of Derivatives
- 3–1 Extreme Values of Functions
- 3–2 The Mean Value Theorem and Differential Equations
- 3–3 The Shape of a Graph
- 3–4 Graphical Solutions of Autonomous Differential Equations
- 3–5 Modeling and Optimization
- 3–6 Linearization and Differentials (Optional)
- 3–7 Newton's Method

Chapter 4 Integration
- 4–1 Indefinite Integrals, Differential Equations, and Modeling
- 4–2 Integral Rules; Integration by Substitution
- 4–3 Estimating with Finite Sums
- 4–4 Riemann Sums and Definite Integrals
- 4–5 The Mean Value and Fundamental Theorems
- 4–6 Substitution in Definite Integrals
- 4–7 Numerical Integration

## IX. Other Required Books and Materials

A scientific calculator is required; a graphing calculator is strongly recommended. Symbolic manipulator calculators (e.g., TI–89 or TI–92) are prohibited on tests.

## X. Evaluation

Instructor will distribute the method of evaluation to students.

## XI. Specific Management Requirements

Assignments will be evaluated according to instructor directives.