I. **Course Title:** Calculus II

**Course Number:** 222  
**Catalog Prefix:** Math

II. **Prerequisites:** Both of the following:
- Math 221
- Math 142 or high school trigonometry

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

IV. **Course Description:**
This course includes differentiation and integration of trigonometric, exponential, logarithmic, and hyperbolic functions; methods of integration; applications of the integral to volumes of rotation, work, fluid forces, and arc length; l’Hôpital’s Rule; improper integrals; and an introduction to basic differential equations.

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. Integrate and differentiate trigonometric and inverse trigonometric functions.
2. Integrate and differentiate exponential, logarithmic and hyperbolic functions.
3. Apply integrals to volumes of rotation, centroids, work, and fluid forces.
4. Find the lengths of plane curves.
5. Apply and solve first-order separable differential equations.
6. Solve integrals by using techniques of integration by parts, partial fractions, trigonometric substitution.
7. Solve integrals by using integral tables.
8. Apply l’Hôpital’s Rule to limits and to solving improper integrals.

VII. **Grading**
Grading will follow the policy in the catalog.

VIII. **Course Outline**
*Topics in Chapters 2 – 4 are confined to trigonometric functions omitted in Math 221.*

- Chapter 2  
  Derivatives  
  2–4 Derivatives of Trigonometric Functions  
  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
  3–5 Modeling and Optimization
  3–7 Newton’s Method (Optional)

Chapter 4 Integration
  4–1 Indefinite Integrals, Differential Equations, and Modeling
  4–2 Integral Rules; Integration by Substitution
  4–5 The Mean Value and Fundamental Theorems
  4–6 Substitution in Definite Integrals
  4–7 Numerical Integration (Optional)

Chapter 5 Applications of Integrals
  5–1 Volumes by Slicing and Rotation About an Axis
  5–2 Modeling Volume Using Cylindrical Shells
  5–3 Lengths of Plane Curves
  5–4 Springs, Pumping, and Lifting
  5–5 Fluid Forces
  5–6 Moments and Centers of Mass

Chapter 6 Transcendental Functions and Differential Equations
  6–1 Logarithms
  6–2 Exponential Functions
  6–3 Derivatives of Inverse Trigonometric Functions; Integrals
  6–4 First-Order Separable Differential Equations
  6–5 Linear First-Order Differential Equations (Optional)
  6–6 Euler’s Method; Population Models (Optional)
  6–7 Hyperbolic Functions

Chapter 7 Integration Techniques, l’Hôpital’s Rule, and Improper Integrals
  7–1 Basic Integration Formulas
  7–2 Integration by Parts
  7–3 Partial Fractions
  7–4 Trigonometric Substitutions
  7–5 Integral Tables, Computer Algebra Systems, and Monte Carlo Integration (Integral Tables only)
  7–6 l’Hopital’s Rule (0/0 and ∞/∞ indeterminate forms)
  7–7 Improper Integrals

IX. Other Required Books and Materials
A graphing calculator is required. 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.