MATH 142 Calculus I (4 hours)

Catalog Description: Functions; continuity; limits; the derivative; differentiation from graphical, numerical and analytical viewpoints; optimization and modeling; rates and related rates; the definite integral; antiderivatives from graphical, numerical and analytical viewpoints. Fall, spring and summer.

Prerequisite: 4 years of high school math or a grade of C- or better in MATH 141.

Technology: A graphing calculator with a TI-84 being the calculator of choice is required. In addition, Maple will be used for some of the topics.


Syllabus:

Chapter 1: A Library of Functions
1.1 Functions and Change
1.2 Exponential Functions
1.3 New Functions from Old
1.4 Logarithmic Functions
1.5 Trigonometric Functions
1.6 Powers, Polynomials, and Rational Functions
1.7 Introduction to Continuity
1.8 Limits

Chapter 2: Key Concept: The Derivative
2.1 How Do We Measure Speed?
2.2 The Derivative at a Point
2.3 The Derivative Function
2.4 Interpretations of the Derivative
2.5 The Second Derivative
2.6 Differentiability

Chapter 3: Short-cuts to Differentiation
3.1 Powers and Polynomials
3.2 The Exponential Function
3.3 The Product and Quotient Rules
3.4 The Chain Rule
3.5 The Trigonometric Functions
3.6 The Chain Rule and Inverse Functions
3.7 Implicit Functions
3.8 Hyperbolic Functions
3.9 Linear Approximation and the Derivative
3.10 Theorems about Differentiable Functions
Chapter 4: Using the Derivative
4.1 Using First and Second Derivatives
4.2 Optimization
4.3 Optimization and Modeling
4.4 Families of Functions
4.5 Applications to Marginality (optional)
4.6 Rates and Related Rates
4.7 L’Hopital’s Rule, Growth, and Dominance
4.8 Parametric Equations

Chapter 5: Key Concept: The Definite Integral
5.1 How Do We Measure Distance Traveled?
5.2 The Definite Integral
5.3 The Fundamental Theorem and Interpretations
5.4 Theorems about Definite Integrals

Chapter 6: Constructing Antiderivatives
6.1 Antiderivatives Graphically and Numerically
6.2 Constructing Antiderivatives Analytically
6.3 Differential Equations and Motion (optional)
6.4 Second Fundamental Theorem of Calculus