CALCULUS/CALCULUS HONORS

CREDIT HOURS: 1.0  COURSE LENGTH: 2 Semesters

COURSE DESCRIPTION

The Calculus course is a comprehensive look at the study of differential and integral calculus concepts including limits, derivative and integral computation, linearization, Riemann sums, the Fundamental Theorem of Calculus, and differential equations. Applications include graph analysis, linear motion, average value, area, volume, and growth and decay models.

The honors level course requires students to utilize higher order thinking skills such as analysis and synthesis, while completing more rigorous assignments. In addition, more emphasis is placed on research mastery and project based learning.

COURSE PREREQUISITES

Pre-Calculus Honors

REQUIRED TEXTBOOK (S) and/or MATERIALS

Graphic Calculator

TOPIC OUTLINE

Unit I: Limits And Continuity

1. Concept of a Limit
2. Algebraic Computation of a Limit
3. Limits Involving Infinity
4. Continuity
5. Intermediate Value Theorem

Unit II: Derivatives

1. Section A- Concept of a Derivative
2. Section B- Differentiability
3. Section C- Graphs of f and f’
4. Section D- Motion along a Line
5. Section E- Tangent Line Approximation
Unit III: Differentiation

1. Basic Computation Rules
2. Higher Order Derivatives
3. Product, Quotient, and Chain Rules
4. Implicit Differentiation
5. Derivatives of Inverse Functions

Unit IV: Graph Behavior

1. Asymptotes and End-Behavior
2. Increasing/Decreasing Behavior and Concavity
3. Relative Extreme Values and Points of Inflection
4. Absolute Extreme Values and Extreme Value Theorem
5. Graph Analysis

Unit V: Derivative Applications

1. Mean Value and Rolle’s Theorems
2. Rates of Change
3. Related Rates
4. Optimization

Unit VI: Antidifferentiation

1. Antiderivatives and Definite Integrals
2. Slope Fields
3. Basic Computation Rules
4. Substitution Rule
5. Initial Value Problems

Unit VII: The Definite Integral

1. Area and the Riemann Sums
2. Approximation Methods
3. Fundamental Theorem of Calculus, Part 1
4. Computation of Definite Integrals
5. Fundamental Theorem of Calculus, Part 2

Unit VIII: Integral Applications

1. Total Change
2. Average Value of a Function
3. Motion along a Line Revisited
Unit IX: Area And Volume

1. Area between Two Curves
2. Volume of Solids Using Cross Sections
3. Volume of Solids of Revolution

Unit X: Differential Equations And Their Applications

1. Separable Differential Equations
2. Modeling Using Differential Equations
3. Growth and Decay Model

University of Miami Global Academy reserves the right to revise the course outline as needed throughout the duration of the course.