

CALCULUS I

MATH 1950

Course Description:

This is a course in plane analytic geometry emphasizing the study of functions, limits, derivatives and applications, and an introduction to integration. **5 credits**

Prerequisites:

ACT Math sub score at least 26, Math SAT at least 590 or Math SAT2016 at least 610 within last 2 years; or Accuplacer or COMPASS score of 7 within last 2 years; or MATH 1320 and MATH 1330 or MATH 1340 with C- or better within last 2 years

Overview of Content and Purpose of the Course:

Calculus is the mathematics of change and this is the first course in a three course sequence of Calculus. This course provides the essential foundation for all higher level mathematics courses. For students not requiring additional math courses, MATH 1950 provides important exposure to the concepts of the derivative and the integral, both important to solving real-world problems.

Major Topics:

1) Limits and Their Properties

- a. A Preview of Calculus
- b. Finding Limits Graphically and Numerically
- c. Evaluating Limits Analytically
- d. Continuity and One-Sided Limits
- e. Infinite Limits

2) Differentiation

- a. The Derivative and the Tangent Line Problem
- b. Basic Differentiation Rules and Rates of Change
- c. Product and Quotient Rules and Higher-Order Derivatives
- d. The Chain Rule
- e. Implicit Differentiation
- f. Derivatives of Inverse Functions
- g. Related Rates
- h. Newton's Method

3) Applications of Differentiation

- a. Extrema on an Interval
- b. Rolle's Theorem and the Mean Value Theorem
- c. Increasing and Decreasing Functions and the First Derivative Test
- d. Limits at Infinity
- e. A Summary of Curve Sketching
- f. Optimization Problems
- g. Differentials

4) Integration

- a. Antiderivatives and Indefinite Integration
- b. Area
- c. Riemann Sums and Definite Integrals
- d. The Fundamental Theorem of Calculus
- e. Integration by Substitution
- f. Numerical Integration
- g. The Natural Logarithmic Function: Integration
- h. Inverse Trigonometric Functions: Integration
- i. Hyperbolic Functions

5) Differential Equations

- a. Slope Fields and Euler's Method
- b. Differential Equations: Separation of Variables

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Textbook:

Larson, Ron, and Bruce H. Edwards. *Calculus, Hybrid: Early Transcendental Functions, 6th ed.* Boston: Cengage Learning, 2014.

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