MTH 263 - Calculus I

Course Description

Effective: 2019-08-01

Presents concepts of limits, derivatives, differentiation of various types of functions and use of differentiation rules, application of differentiation, antiderivatives, integrals and applications of integration. This is a Passport Transfer course.
Lecture 4 hours. Total 4 hours per week.
4 credits

General Course Purpose

The general purpose of this first course in a three course sequence is to prepare students for further study in calculus with analytic geometry by providing them with the necessary competencies in finding limits, differentiation and integration.

Course Prerequisites/Corequisites

Prerequisite: Completion of MTH 167 or MTH 161/162 or equivalent with a grade of C or better.

Course Objectives

- Limits
    - Differentiate between the limit and the value of a function at a point
    - Find the limit of a function by numerical, graphical and analytic methods
    - Apply Limit Laws
    - Calculate one-sided limit of a function
    - Prove the existence of a limit using precise definition of the limit
    - Determine the continuity of a function
    - Calculate Vertical and Horizontal asymptotes using limits
- Derivatives and Differentiation Rules
    - Define Derivatives and Rates of Change
    - Compute derivatives of basic functions using the definition of the derivative
    - Differentiate polynomial, rational, radical, exponential and logarithmic functions ᵒ Find equation of a tangent line using derivative
    - Differentiate trigonometric functions
    - Apply product, quotient, chain rules
    - Apply implicit differentiation and find derivatives of inverse trigonometric functions
    - Apply concept of rates of change to natural and social sciences
    - Apply the concept of related rates
    - Define hyperbolic functions and their derivatives
    - Find linear approximation of a function at a given point

- Applications of Differentiation
  - Calculate local and absolute maximum and minimum values of a function
  - Apply Rolle's Theorem and Mean Value Theorem to study properties of a function
  - Find critical points, and intervals of increasing and decreasing values of a function
  - Find points of inflection and intervals of different concavities
  - Sketch a curve for a given function
  - Apply rules of differentiation to solve optimization problems
  - Find antiderivatives for basic functions using knowledge of derivatives
- Integrals
  - Relate areas to definite integrals using sigma notation, Riemann Sums, and limits. [Note: L?Hopital?s Rule is in Calc II but may be used for instructional purposes here.]
  - Apply Fundamental Theorem of Calculus to find definite integrals and derivatives
  - Find indefinite integrals of polynomials and basic trigonometric and exponential function
  - Apply Net Change Theorem
  - Perform integration using substitution
  - Find areas between curves
  - Find average value of a function

Major Topics to be Included

- Limits
- Derivatives and Differentiation Rules
- Applications of Differentiation
- Integrals