Math 231: Calculus I (3 credit hours)

Course Description
This is a standard second course in the Calculus sequence. Topics for this course include techniques and applications of integration, infinite sequences, power series, parametric equations, and an introduction to differential equations.

Prerequisite: Calculus I

Course Objectives
After completing this course a successful student will be able to understand and apply the concepts of Calculus listed above. He/she will also be able to apply numerical, computational, and estimation techniques as well as the process of measurement. Through exploration, a successful student will be able to use geometric concepts and relationships to describe and model mathematical ideas. He/she will also have the necessary tools to formulate and solve problems in both mathematical and everyday situations, and connect mathematics to other disciplines. Most importantly, a student completing this course will be able to communicate mathematical ideas through descriptive language as well as mathematical symbols.

Course Content and Format

Content
A brief outline of topics for this course appears below:

- Growth
  - Linear, exponential, and trigonometric functions
  - Dominance in the global scale
  - Data modeling and analysis

- Expansions in Powers of x
  - Approximating various functions
  - Differentiating and Integrating to find new expansions

- Applications of Expansions
  - Newton’s Method
  - Calculating limits
  - Generating trigonometric identities
• Taylor’s Formula
  o Estimating integrals
  o Applying Taylor’s Formula to calculate limits
  o Approximating solutions to differential equations

• Barriers to Convergence
  o Examining convergence of various expansions
  o Convergence intervals and infinite sums

• Power Series
  o Functions defined by power series and their plots
  o Convergence intervals for power series
  o The Ratio Test

• Parametric Plotting
  o Plotting ellipses, curves, and surfaces
  o Applications including projectile motion

• Integrals for Area and Volume Measurement
  o Properties of integrals
  o Approximation using trapezoidal rule
  o Measuring by slicing and accumulating

• The Fundamental Formula of Calculus
  o Finding distance and velocity
  o Integrating the area between two curves
  o Applying the formula to differential equations

• Techniques for Calculating Integrals
  o Integration by parts
  o Applying a complex exponential to integrate
  o Partial Fractions and u-substitution

Format

Course content is drawn from *Calculus II* and *Calculus III* written by Bill Davis, Horacio Porta and Jerry Uhl ©2006-2010.

Math 231 utilizes the Mathable system. This online system incorporates NetMath courseware that helps students learn math topics through dynamic exploration and visualization.

Exams for Math 231 are taken with pencil and paper.