Virginia Western Community College
MTH 264
Calculus II

Prerequisites
Completion of MTH 263 or equivalent with a grade of C or better.

Course Description
Continues the study of calculus of algebraic and transcendental functions including rectangular, polar, and parametric graphing, indefinite and definite integrals, methods of integration, and power series along with applications. Designed for mathematical, physical, and engineering science programs.

Semester Credits: 4 **Lecture Hours: 4**

Required Materials
Textbook:
University Calculus. Hass, Weir & Thomas. 4th edition. Pearson/Addison-Wesley. ISBN: 9780134995540.

Course Outcomes

At the completion of this course, the student should be able to:

- Solve appropriate applied problems from the area of science and engineering.
- Evaluate improper integrals.
- Integrate transcendental functions.
- Find area and volume of solids of revolution.
- Use the rectangular and polar coordinate systems including finding area, lengths, and graphing.
- Graph, evaluate, differentiate, integrate and define parametrized functions and applications.
- Determine whether an infinite series is convergent or divergent.
- Find the radius of convergence of a Taylor Series.

Course Objectives

- Applications of Integration
  - Compute Volumes by cross-section
  - Compute Volumes by disk-washer
  - Compute Volumes by shells
  - Compute Work (spring, rope)
  - Compute Work (pumping liquids)
  - Compute Arc length
  - Compute Areas of surfaces of revolution
  - Compute Application (center of mass)
- Techniques of Integration
  - Integrate by parts
  - Calculate trigonometric integrals
  - Calculate integrals by trigonometric substitution
  - Define the indeterminate form and apply L'Hopital's Rule.
  - Calculate improper integrals
  - Integrate by partial fractions
  - Integrate using Tables and Software
  - Approximate integrals (Trapezoidal, Simpson) with error estimation.
- Infinite Sequences and Series
  - Write definition of and understand Sequences
  - Write definition of and understand Series (intro)
  - Determine convergence by integral test
  - Determine convergence by comparison test
  - Determine convergence of alternating series
  - Determine absolute convergence (ratio, root tests)
  - Apply strategies for testing series
  - Work with power series
  - Represent functions as power series
  - Find Taylor, Maclaurin series & polynomials
  - Calculate Taylor and Maclaurin series
- Parametric Curves and Polar Coordinates
  - Represent curves by parametric equations
  - Perform calculus with parametric curves
  - Use and graph with polar system
  - Calculate areas and lengths in polar coordinates
  - Define the conic forms in polar form

Textbook Topical Description

6 Applications of Definite Integrals
6.1 Volumes Using Cross-Sections
6.2 Volumes Using Cylindrical Shells
6.3 Arc Length
6.4 Areas of Surfaces of Revolution
6.5 Work
6.6 Moments and Centers of Mass
7 Integrals and Transcendental Functions
7.1 The Logarithm Defined as an Integral
7.2 Exponential Change and Separable Differential Equations
8 Integration by Parts
8.1 Trigonometric Integrals
8.2 Trigonometric Substitutions
8.3 Integration of Rational Functions by Partial Fractions
8.4 Integral Tables and Computer Algebra Systems
8.5 Numerical Integration
4.5 Indeterminate Forms and L'Hôpital's Rule
8.6 Improper Integrals
8.7 Infinite Sequences and Series
9 Sequences
9.1 Infinite Series
9.2 The Integral Test
9.3 Comparison Tests
9.4 The Ratio and Root Tests
9.5 Alternating Series, Absolute and Conditional Convergence
9.6 Power Series
9.7 Taylor and Maclaurin Series
9.8 Convergence of Taylor Series
9.9 The Binomial Series and Applications of Taylor Series
9.10 Parametric Equations and Polar Coordinates
10 Parametrizations of Plane Curves
10.1 Calculus with Parametric Curves
10.2 Polar Coordinates
10.3 Graphing in Polar Coordinates
10.4 Areas and Lengths in Polar Coordinates
10.5 Areas and Lengths in Polar Coordinates

Notes to Instructors

A comprehensive final exam is required.

ADA Statement (PDF)
Title IX Statement (PDF)