

Common Course Outline

MATH 252

Calculus II

4 Credits

Community College of Baltimore County

Description

MATH 252 – Calculus II covers antiderivatives, approximation techniques for definite integrals, integration techniques, improper integrals, applications of definite integrals, infinite series, power series, Taylor series, and introduction to differential equations.

4 Credits: 5 lecture hours

Prerequisite: MATH 251 with a grade of “C” or better

Overall Course Objectives

Upon successfully completing the course students will be able to:

1. evaluate integrals using various integration techniques;
2. evaluate an improper integral;
3. calculate volumes by cross section, discs/washers and shells;
4. calculate arc length and surface area of revolution;
5. solve problems from physics (work, moments, pressure);
6. determine convergence/divergence of a sequence;
7. determine convergence/divergence of a series;
8. create Power Series of functions and use them for estimation;
9. solve first order differential equations;
10. examine the mathematical contributions made by people from diverse cultures throughout history;
11. articulate a solution to mathematical problems;
12. apply appropriate technology to the solution of mathematical problems;
13. evaluate limits using L'Hopital's Rule; and
14. graph and analyze Polar Coordinates and Parametric Equations.

Major Topics

- I. Applications of the definite integral

- A. Volumes by cross-section
 - B. Volumes of revolution-disks/washers
 - C. Volumes of revolution-cylindrical shells
 - D. Arc length
 - E. Area of a surface of revolution
 - F. Applications in physics (moments, work, pressure)
- II. Techniques of integration
- A. Integration by parts
 - B. Powers of sine and cosine or secant and tangent
 - C. Trigonometric substitution
 - D. Rational functions (by partial fractions)
 - E. Miscellaneous substitution (e.g. $u = \tan(x/2)$)
 - F. Using integral tables
 - G. Improper integrals and L'Hopital's Test
- III. Sequences, series, and power series
- A. Sequences
 - B. Monotone sequences
 - C. Infinite series
 - D. Convergence tests for infinite series
 - E. Taylor and Maclaurin series
 - F. Tests for convergence
 - G. Approximation of series
 - H. Absolute convergent, Conditional convergent or Divergent series
 - I. Geometric, Harmonic, Telescoping and Binomial Series
 - J. Approximation and error using power series
 - K. New power series from old (via substitution, integration, differentiation, etc.)
 - L. Taylor series and remainder
 - M. Interval and radius of convergence for power series
- IV. Other coordinate systems
- A. Polar coordinates (graphing, area, arc length, tangent, surface area of revolution)
 - B. Parametric equations (graphing, area, arc length, tangent, surface area of revolution)
 - C. Conic sections (optional)
- V. Optional Material
- A. Introduction to differential equations
 - B. First-order differential equations and applications
 - C. Separable Equations
 - D. Homogeneous Equations
 - E. De Moivre's Theorem

Course Requirements

Grading procedures will be determined by the individual faculty member but will include the following:

Grading/exams

- At least two tests
- A comprehensive final examination

Date revised: 01/30/2019