

Common Course Outline

MATH 252

Calculus II

4 Semester Hours

The Community College of Baltimore County

Description

Topics include 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.

Overall Course Objectives

Upon successfully completing the course students will be able to:

1. Evaluate integrals using various integration techniques (III, 1, 2)
2. Approximate a definite integral using Simpson's Rule and Trapezoid Rule (I, IV, 4, 5)
3. Evaluate an improper integral (VI, 1)
4. Calculate volumes by cross section, discs /washers and shells (III, IV, 1, 3, 7)
5. Calculate arclength and surface area of revolution (III, 1, 3, 5, 7)
6. Solve problems from physics (work, moments, pressure) (II, V, 1, 6)
7. Determine convergence/divergence of a sequence (IV, 1, 3)
8. Determine convergence/divergence of a series (IV, 1, 3)
9. Create Power Series of functions and use them for estimation (I, 1)
10. Solve first order differential equations (II, V, 1, 2, 3)
11. Examine the mathematical contributions made by people from diverse cultures throughout history. (V, 5)
12. Articulate a solution to mathematical problems. (II, 2)
13. Apply appropriate technology to the solution of mathematical problems. (IV, 4, 5).
14. Evaluate limits using L'Hopital's Rule (I, 1, 3)
15. Graph and analyze Polar Coordinates and Parametric Equations (III, IV, 1, 2, 4)

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. Arclength
 - 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. Numerical integration (Right, Left, Midpoint, Trapezoid, and Simpson's) with error bounds
- H. 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, arclength, tangent, surface area of revolution)
- B. Parametric equations (graphing, area, arclength, tangent, surface area of revolution)

Course Requirements (General Education Goal #VII)

Students will be given opportunity to collaborate via group work and/or oral presentation of problem solutions. There will be multiple opportunities for the instructor to assess student progress in the course through classwork and/or homework.

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

Tests, Exams, and/or Quizzes: At least two tests will be given. Individual faculty will notify students of the testing procedures to be used.

Comprehensive Final Exam: The course will include a comprehensive final exam, which may include a final project.

Final Grades: Grades will be determined by individual faculty members.

The Community College of Baltimore County is committed to providing a high-quality learning experience that results in growth in knowledge, attitudes, and skills necessary to function successfully as a transfer student, in a career and as a citizen. To accomplish this goal, we maintain high academic standards and expect students to accept responsibility for their individual growth by attending classes, completing all homework and other assignments, participating in class activities and preparing for tests.

We take seriously our responsibility to maintain high-quality programs and will periodically ask you to participate in assessment activities to determine whether our students are attaining the knowledge, attitudes and skills appropriate to various courses and programs. The assessment activities may take many different forms such as surveys, standardized or faculty-developed tests, discussion groups or portfolio evaluations. We ask that

you take these activities seriously so that we can obtain valid data to use for the continuous improvements of CCBC's course and programs.

Other Course Information:

Optional Material may include:

- I. Introduction to differential equations
 - A. First-order differential equations and applications
 - B. Separable Equations
 - C. Homogeneous Equations
 - D. Normal Equations and Integrating Factor
 - E. Bernoulli Equations
 - F. Modeling with differential equations

Date revised: 10/28/03