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