

COURSE OUTLINE
MATH 182 Calculus II
4 Semester Hours
HOWARD COMMUNITY COLLEGE

Description

This course is a continuation of Calculus I (MATH 181), developing further applications of differentiation and integration in preparation for Calculus III (MATH 240). Applications include area bounded by curves, volume by rotating and slicing, arc length, work, and centers of mass. Integration techniques taught include integration by parts, partial fractions, trigonometric substitution, numerical integration, and improper integrals. Students will be introduced to hyperbolic functions, elementary differential equations, direction fields, and their applications. The study of sequences and infinite series will include tests for convergence of the various types of series, leading to power series and Taylor series. Students will also learn about parametric equations, polar coordinates and their applications to calculus. A graphing calculator is required. The use of a computer algebra system will be an integral part of the course. Prerequisite: MATH 181 or equivalent. (4 hours weekly)

Statement on General Education and Liberal Learning

A liberal education prepares students to lead ethical, productive, and creative lives and to understand how the pursuit of lifelong learning and critical thinking fosters good citizenship. General education courses form the core of a liberal education within the higher education curriculum and provide a coherent intellectual experience for all students by introducing the fundamental concepts and methods of inquiry in the areas of mathematics, the physical and natural sciences, the social sciences, the arts and the humanities, and composition. This course is part of the general education core experience at Howard Community College.

Overall Course Objectives

Upon completion of this course, the student will be able to:

1. Apply basic integral rules to solve geometry and physics application problems.
2. Differentiate and integrate hyperbolic functions.
3. Recognize and apply the appropriate method of integration to solve a problem.
4. Approximate definite integrals numerically.
5. Evaluate improper integrals.
6. Determine the direction field of a differential equation.
7. Solve separable differential equations.
7. Determine the convergence or divergence of a sequence, and if it converges, find its limit.
8. Apply the appropriate test to determine whether an infinite series converges or diverges.
9. Calculate either the exact or an approximate value of a convergent infinite series.
10. Approximate a function with a Taylor polynomial.
11. Apply the properties of power functions to determine the radius of convergence.
12. Apply calculus to understand parametrically defined curves.
13. Apply calculus to understand the graphs of equations in polar coordinates.
14. Use a computer algebra system as a means of discovery, to reinforce concepts, and as an efficient problem solving tool.

Major Topics

- I. Applications of Integration
 - A. Velocity and Net Change
 - B. Regions Between Curves
 - C. Volume by Slicing
 - D. Volume by Shells
 - E. Length of Curves
 - F. Physical Applications
 1. Centers of Mass
 2. Work
 - G. Differential Equations
 1. Direction Fields
 2. General Solutions and Initial Conditions
 3. Solving Separable First Order Differential Equations
 4. Exponential and Logistic Models
 - H. Hyperbolic Functions
- II. Integration Techniques
 - A. Integration by Parts
 - B. Trigonometric Integrals
 - C. Trigonometric Substitution
 - D. Partial Fractions
 - E. Numerical Integration
 1. Trapezoid Rule
 2. Simpson's Rule
 - F. Improper Integrals
- III. Sequences and Infinite Series
 - A. Sequences and Convergence
 - B. Infinite Series
 - C. Integral Test and p-Series
 - D. Estimating the Value of a Converging Series
 - E. Comparison Tests
 - F. Ratio and Root Tests
 - G. Alternating Series
- IV. Power Series
 - A. Taylor Polynomial Approximations to Functions
 - B. Properties and Convergence of Power Series
 - C. Taylor Series and Remainders
 - D. Applications of Taylor Series
- V. Parametric and Polar Curves
 - A. Parametric Equations, Plane Curves and Tangent Lines
 - B. Polar Coordinates
 - C. Calculus in Polar Coordinates

Course Requirements

Grading/Exams: Grading procedures will be determined by the individual faculty member within the guidelines of the Mathematics Division and will include several unit exams, projects and a comprehensive departmental final exam.

Required Text: Calculus: Early Transcendentals, 1st edition, by Briggs & Cochran

Required Online Homework: MyMathLab

Required Calculator: Programmable Graphing Calculator (TI-83+/84 recommended)

Other Course Information

This course may be used as a Mathematics core course or as an Arts and Science elective. Check with your transfer institution concerning transferability for your program.