

COURSE OUTLINE

MATH 150 Calculus II 4 Semester Hours

HOWARD COMMUNITY COLLEGE

Description

In this course, students will develop additional skills in calculus (see MATH 140 and MATH 240). Derivatives and integrals are extended to hyperbolic, inverse trig, inverse hyperbolic, and power series. Integration techniques taught include parts, partial fractions, and trigonometric substitution. Limits are supplemented with L'Hopital's rule. Convergent and divergent integrals are discussed in the class. Applications deal with area bounded by curves, work, volume by rotating and slicing, surface area, arc length, and force. Numerical techniques of integration are briefly discussed. Infinite series material covers both sequences and series, convergence and divergence of alternating, power, Taylor and MacLaurin series. In addition, it will include polar and parametric functions. A graphing calculator is recommended. The use of a computer algebra system will be an integral part of the course. Prerequisite: MATH 140 or equivalent. (4 hours weekly)

Overall Course Objectives

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

1. Apply basic integral rules to application problems.
2. Memorize and apply the derivatives of the hyperbolic and inverse trigonometric to application problems.
3. Apply the rules for the integrals of hyperbolic and inverse trigonometric functions.
4. Recognize and apply the appropriate method of integration to solve a problem.
5. Evaluate improper integrals.
6. Apply L'Hopital's Rule to find limits of appropriate indeterminate forms.
7. Use other methods to find limits of indeterminate forms where L'Hopital's Rule is inappropriate.
8. Determine the convergence or divergence of a sequence; and if it converges, find its limit.
9. Determine whether an infinite series converges or diverges.
10. Apply the properties and principles of infinite series to calculate either the exact or an approximate value of an infinite series.
11. Graph rotated conics and equations in polar and parametric form.
12. Use the computer algebra system, DERIVE, as a means of discovery, to reinforce concepts, and as an efficient problem solving tool.

Major Topics

- I. Transcendental Functions
 - A. Inverse Trigonometric Functions and Differentiation
 - B. Inverse Trigonometric Functions, Integration, and Completing the Square
 - C. Hyperbolic Functions

- II. Applications of Integration
 - A. Area of a Region Between Two Curves
 - B. Volumes By the Disk, Washer, and Slicing Method
 - C. Volumes By the Shell Method
 - D. Arc Length and Surfaces of Revolution
 - E. Work
 - F. Fluid Pressure and Force

- III. Integration Techniques, L'Hopital's Rule and Improper Integrals
 - A. Integration by Parts
 - B. Trigonometric Integrals
 - C. Trigonometric Substitution
 - D. Partial Fractions
 - E. Using Tables and Other Integration Techniques
 - F. Indeterminate Forms of Limits and L'Hopital's Rule
 - G. Improper Integrals

- IV. Infinite Series
 - A. Sequence
 - B. Series and Convergence
 - C. The Integral Test and p-Series
 - D. Comparison of Series
 - E. Alternating Series
 - F. The Ratio and Root Test
 - G. Taylor Polynomials and Approximation
 - H. Power Series
 - I. Functions Represented as Power Series
 - J. Taylor and Maclaurin Series

- V. Conics, Parametric Equations and Polar Coordinates
 - A. Rotation of Conics
 - B. Plane Curves and Parametric Equations
 - C. Polar Coordinates and Polar Graphs
 - D. Area and Arc Length in Polar Coordinates

Course requirements

Grading Exams: Grading procedures will be determined by the individual faculty member but will be based on several unit exams and a comprehensive final.

A graphing calculator such as the TI83+ is required.

Other Course Information

This course may be used as a Mathematics core course or as a Mathematics elective and will transfer to a four-year university.