

COURSE OUTLINE

MATH-145 Business Calculus 3 Semester Hours

HOWARD COMMUNITY COLLEGE

Course Description

Students will develop skills in initial content of both differential and integral calculus, with an emphasis on applications from business and economics. Topics include finding the limits of functions, computing derivatives of polynomial, rational, radical, exponential, and logarithmic functions using the chain rule and the basic differentiation rules, and substitution in finding definite and indefinite integrals. Applications include dealing with optimization, related rates, marginal analysis, supply and demand, and area.

Graphs of functions will be analyzed using first and second derivatives and limits to identify asymptotes, intervals of increase/decrease, maxima/ minima, concavity, and points of inflection. The fundamental theorem of calculus, implicit differentiation, differentials and summations of area will be used when appropriate. Students can not receive credit for both MATH-145 and MATH-181. Prerequisite: MATH-131 or MATH-141 or equivalent. (3hours 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 successful completion of this course, the student will be able to:

1. Solve and explain problem solutions while using correct mathematical notation.
2. Compute limits of various functions at given points and determine continuity.
3. Compute derivatives of functions either implicitly or explicitly.
4. Compute integrals of functions using sight formulas, algebra or substitution.
5. Apply the theory of derivatives to the graphing of functions, related rates problems, optimization problems, and marginal analysis involving revenue, cost, profit, supply, and demand functions.
6. Apply the theory of integrals to solve various application problems dealing with the area of a region between two curves.
7. Use technology, as a means of discovery, to reinforce concepts, and as an efficient problem solving tool to complete given projects.

Major Topics

- I. Limits and Continuity
- II. Differentiation
 - A. The Derivative: Tangent Lines and Rates of Change
 - B. Basic Differentiation Rules: The Product, Quotient and Chain rule
 - C. Higher-Order Derivatives
 - D. Implicit Differentiation and Related Rates
- III. Applications of Differentiation
 - A. Increasing and Decreasing Functions
 - B. Extrema and the First Derivative Test
 - C. Concavity and the Second Derivative Test
 - D. Optimization Problems using Business and Economics Applications
 - E. A Summary of Curve Sketching & Asymptotes
 - F. Differentials and Marginal Analysis
 - G. Elasticity of Demand
- IV. Logarithms and Exponential functions
 - A. The Natural Logarithmic Function and Differentiation
 - B. The Natural Logarithmic function and Integration
 - C. Exponential functions: Differentiation and Integration
 - D. Bases Other than e and Applications
- V. Integration
 - A. Antiderivatives and Indefinite Integration
 - B. Area and Definite Integrals
 - C. The Fundamental Theorem of Calculus
 - D. Integration by Substitution

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 final exam.

Technology requirements: Graphing calculator (TI-84 recommended) and required course software.

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.