Common Course Outline
MATH 230
Calculus with Applications
3 Semester Hours

The Community College of Baltimore County

Description

This course examines applications of differential and integral calculus related to business, natural science and social science situations. Students will learn the calculus of linear, polynomial, rational, logarithmic and exponential functions. Prerequisites: MATH 161 or MATH 163, or LVM5.

Overall Course Objectives

Upon successfully completing the course, students will be able to:

1. Evaluate limits using substitution, tables, and graphs.(I, IV, VI, 1, 5)
2. Utilize function notation to define and evaluate functions.(III, 2, 4, 5)
3. Demonstrate the relationship between functions and their graphs.(IV, 2, 4, 5)
4. Apply and evaluate limits algebraically.(I, IV, V, VI, 1, 5)
5. Evaluate infinite limits and limits at infinity.(I, IV, VI, 1, 5)
6. Apply the definition of the derivative.(IV, V, VI, 2, 3)
7. Solve maximum and minimum problems using differential calculus.(IV, V, 4, 6, 7)
8. Solve marginal analysis problems using differential calculus. (IV, V, 4, 6, 7)
9. Solve exponential growth and decay problems using differential calculus. (II, IV, V, 3, 4, 6, 7)
10. Apply differential and integral calculus techniques and methods to solve various other business, management, natural science and social science problems.(II, V, 6)
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).

Major Topics

I. Functions, Limits and the Derivative
- A. Functions and Graphs
- B. Algebra of Functions
- C. Functions and Mathematical Models
- D. Limits
- E. One-sided Limits and Continuity
- F. Derivative

II. Differentiation
- A. Basic Rules of Differentiation
- B. Product and Quotient Rules
- C. Chain Rule
- D. Marginal Functions in Economics
- E. Higher Order Derivatives
- F. Implicit Differentiation
- G. Differentials

III. Applications of the Derivative
- A. Increasing and Decreasing Functions
- B. Relative Maxima and Minima
- C. Concavity and Points of Inflection
- D. Curve Sketching
- E. Optimization Problems

IV. Exponential and Logarithmic Functions
- A. Exponential Functions
- B. Logarithmic Functions
- C. Compound Interest
- D. Differentiation of Exponential and Logarithmic Functions
- E. Exponential Functions as Mathematical Models

V. Integration
- A. Antiderivatives and Integration Rules
- B. Integration by Substitution
- C. Area and the Definite Integral
- D. Fundamental Theorem of Calculus
- E. Area Between Curves
- F. Applications of the Definite Integral in Business and Economics

VI. Additional Topics in Integration
- A. Integration by Parts
- B. Integral Tables
- C. Numerical Integration
- D. Improper Integration
- E. Applications of Probability

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:

1. Three unit exams.
2. Comprehensive Final Exam

Individual faculty members may include additional course objectives, major topics, and other course requirements to the minimum expectations stated in the Common Course Outline.

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.

Date revised: 10.10.06
Updated: 03.05.07