

MATHEMATICS 258
CALCULUS FOR BUSINESS, BEHAVIORAL & SOCIAL SCIENCES

I. Introduction

A. Catalog Description

This course takes a problem-solving approach to the concepts and techniques of differential calculus, using polynomial, rational, exponential, and logarithmic functions. It includes an introduction to multivariate topics. Applications are selected primarily from business and the behavioral and social sciences. This course is not intended for mathematics majors, but is recommended for students going on to graduate school in business or desiring more quantitative courses in their studies. Students with some prior exposure to calculus should consider the MATH 121, MATH 122, MATH 221 sequence. *Prerequisite: Three years of high school mathematics. No student may earn credit for MATH 258 after earning credit for any one of MATH 121, MATH 122, or MATH 221.*

B. Objectives

Students will learn the concepts and techniques of calculus needed for solving problems selected primarily from business and the behavioral and social sciences. Students will learn to use technology appropriate for problem solving using elementary functions.

This course satisfies the Mathematical Approaches category of the university's core curriculum by developing an appreciation of the power of Mathematics and formal methods to provide a way of understanding a problem unambiguously, describing its relation to other problems, and specifying clearly an approach to its solution. A student in this course will develop a variety of mathematical skills, an understanding of formal reasoning, and a facility with applications. Specifically, this course will develop the study of formal logic, at least to the extent that is required to understand mathematical proof.

C. Prerequisites

Three years of high school mathematics.

II. Required Topics

A. Functions

1. Definition of a function
2. Multiple representations of functions
 - Symbolic
 - Graphical
 - Numerical
3. Algebra of functions
4. Review of certain functions
 - polynomial functions
 - power functions
 - rational functions
5. Finding zeros of functions

B. Limits and Continuity

- Intuitive idea of a limit of a function
- Definition of continuity of a function at a point.

C. The Derivative

1. Definition
2. Interpretation
 - Slope of a curve at a point
 - Rate of change
3. Differentiability and Continuity
4. Rules of differentiation
5. Applications
 - Curve sketching
 - Optimization Problems
 - Implicit differentiation and Related Rates

D. The Exponential and Logarithm Functions

1. Exponential Functions and their derivatives
2. Logarithm Functions and their derivatives
3. Exponential Growth and Decay

E. Multivariate Calculus

1. Functions of Several Variables
2. Partial Differentiation
3. Maxima and Minima
4. The Method of Lagrange Multipliers

III. Optional Topics

A. Consequences of continuity

1. Intermediate Value theorem
2. Extreme Value theorem
3. Bisection method

B. An introduction to integral calculus

IV. Bibliography

Lial, Miller & Greenwell	<u>Calculus with Applications, Brief Version</u> , Addison Wesley
Larson, Hostetter & Edwards	<u>Brief Calculus with Applications</u> , Houghton Mifflin
Coughlin & Zitarelli	<u>Calculus with Applications</u> , Saunders/HBJ
Goldstein, Lay & Schneider	<u>Brief Calculus and its Applications</u> , Prentice Hall

V. Assessment Tools

Assessment of the extent to which a student meets the course objectives could be measured with homework assignments, quizzes, computer and calculator exercises, case studies and/or projects, and examinations.