

MATHEMATICS 122 Integral Calculus  
CALCULUS AND ANALYTIC GEOMETRY II

I. Introduction

A. Catalog Description

Math 122 is a continuation of Math 121. Math 122 focuses on integration and its relation to differentiation. Topics include definite integrals, antiderivatives, the Fundamental Theorems of Calculus, applications of integration, sequences, and series. The central ideas are explored from the symbolic, graphic, numeric, and physical model points of view. Use is made of graphing calculators. *Prerequisite: Math 121 or its equivalent.* Satisfies the Mathematical Reasoning core requirement.

B. Objectives

The primary goal for students in this course is to appreciate the power and the beauty of the calculus. Students will study concepts, techniques, and applications connected to the central ideas of integration, sequences, and series. Students will also sharpen their critical thinking, logical reasoning, and problem solving skills.

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 - Math 121 or its equivalent.

II. Required Topics

A. Integration

1. Definite integrals
2. Antiderivatives
3. Fundamental Theorems of Calculus
4. Techniques of integration
5. Numerical methods

B. Applications of integration

1. Area
2. Volume
3. Arclength and surface area
4. Applications in physics (work, fluid force)

C. Sequences and series

1. Sequences
2. Series
3. Power series
4. Taylor polynomials and Taylor series

III. Bibliography

G. L. Bradley & Calculus  
K. J. Smith,

Thomas Dick & Charles Patton, Calculus of a Single Variable

A. Ostebee and P. Zorn, Calculus

D. Hughes-Hallett & Calculus  
A. Gleason,

J. Stewart Calculus