



Syllabus

MAT 272 - Calculus II

General Information

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Department Mathematics

Course Prefix MAT

Course Number 272

Course Title Calculus II

Course Information

Catalog Description A continuation of the topics studied in Calculus I, in particular anti-differentiation and integration of functions and their applications. Also included are various techniques of integration, improper integrals, indeterminate limit forms, infinite series, Taylor polynomials, power series, and an introduction to differential equations

Credit Hours 4

Lecture Contact Hours 4

Lab Contact Hours 0

Other Contact Hours 0

Grading Scheme Letter

Prerequisites

MAT 271

Co-requisites

None

First Year Experience/Capstone Designation

This course **DOES NOT** satisfy the outcomes applicable for status as a FYE or Capstone.

SUNY General Education

This course is designated as satisfying a requirement in the following SUNY Gen Ed category

Mathematics (and Quantitative Reasoning)

FLCC Values

Institutional Learning Outcomes Addressed by the Course

Inquiry and Interconnectedness

Course Learning Outcomes

Course Learning Outcomes

1. Understand the connections between definite integrals, total change in quantities, and geometry.
2. Determine indefinite integrals.
3. Apply the Fundamental Theorem of Calculus and techniques of integration to solve problems.
4. Use series to represent functions and approximate values.

Outline of Topics Covered

- I. Definite Integrals
 - a. Riemann Sums and sigma notation
 - b. Definition using limits
 - c. Approximation Techniques
 - i. using area
 - ii. using sums: left, right, midpoint, trapezoid, Simpson's rule
 - iii. using Taylor series
 - d. Properties
 - e. Evaluation using substitution, area, polar coordinates

II. Fundament Theorem of Calculus

- a. Net-Change viewpoint
- b. Construction theorem viewpoint
- c. Evaluating definite integrals

III. Applications

- a. Basic Mechanics
- b. Geometry: Area of bounded region
- c. Solids of Revolution: Volume using “Washers” and “Shells”
- d. Finding mass given density function
- e. Center of Mass
- f. Arclength and Surface Area

IV. Antiderivatives

- a. Definition
- b. Approximating antiderivatives graphically and numerically
- c. Solving Initial Value Problems (IVP)

V. Indefinite Integrals

- a. Reversing basic derivative rules (elementary antiderivatives)
- b. Properties
- c. Integration Techniques
 - i. Substitution
 - ii. Integration by Parts
 - iii. Partial Fraction Decomposition
 - iv. Trigonometric substitution
- d. Table of integrals

VI. Improper Integrals

- a.** Definition
- b.** Convergence vs. divergence
- c.** Application

VII. Series

- a.** Convergence vs. divergence
- b.** Geometric series
- c.** Applying convergence tests
 - i.** Divergence Test
 - ii.** Integral Test
 - iii.** Comparison Test
 - iv.** Alternating Series Test
 - v.** Ratio Test
- d.** Taylor Series
 - i.** Defining
 - ii.** Recognizing known series
 - iii.** Applications
- e.** Power Series
 - i.** Radius of Convergence
- f.** Absolute vs. conditional convergence