

ROWAN UNIVERSITY
Department of Mathematics

Syllabus

Math 01.131 - Calculus II

CATALOG DESCRIPTION:

Math 01.131 Calculus II, 4 s.h.

Prerequisite: Math 01.130 (Calculus I) with a grade of C- or better

This course is a continuation of Calculus I. It primarily deals with three major areas of Calculus: integration techniques, applications of definite integrals, and infinite series. Topics include: integration by parts, trigonometric substitutions, integration by partial fractions; volumes of solids, arc lengths, areas of surfaces of surfaces of revolution, work, hydro-static forces, centers of mass; and infinite sequences and series. Also included are some shorter but indispensable materials, such as derivatives of inverse trigonometric functions, indeterminate forms, improper integrals, polar coordinates, parametric equations and numerical methods for integration. Emphasis is on understanding of meaningful examples and applications. A graphing calculator is required for this course, and so is the use of a computer algebra system, such as Mathematica.

OBJECTIVES:

Students will demonstrate the ability to

- Differentiate and integrate inverse trigonometric functions.
- Find integrals using the techniques of u-substitution, integration by parts, trigonometric substitutions, integration by partial fractions, and numerical methods.
- Use definite integrals for problems of volumes, arc lengths, areas of surfaces of revolution, work, hydro-static forces and mass centers.
- Recognize and evaluate indeterminate forms and improper integrals.
- Apply right tests or techniques to the question of convergence or divergence of an infinite series.
- Find Taylor Series and their intervals of convergence.
- Work with parametric equations, and find area enclosed by polar curves.

CONTENT:

1. Applications of Definite Integrals

- Area between two curves (a brief review)
- Volume of a solid: the shell method and the slicing method
- Arc length
- Area of a surface of revolution
- Applications in physics: work, hydro-static force, the center of mass

2. Techniques of Integration

- Integration by parts
- Substitutions
- Integration by Partial fractions
- Numerical methods
- Improper integrals

3. Infinite Series

- Central questions and fundamental concepts of sequences and infinite series
- Two most useful examples: geometric series and p-series
- Tests for convergence: divergence test, integral test, comparison tests, absolute convergence test, alternating series test, ratio test and root test
- Power series and the interval of convergence
- Taylor polynomials, Taylor series, and their applications

4. Analytic Geometry and Others

- Polar coordinates
- Parametric equations
- Conic sections
- Derivatives of inverse trig. functions, and inverse hyperbolic functions
- L'Hopital's rules

REMARKS: We will continue our effort to present a fuller account of the subject with its history and legends of the mathematicians who helped create it. In addition, we will continue our work using Mathematica as a tool in solving problems.

TEXTBOOK(s):

- Rogawski, Jon; Colin Adams, CALCULUS: EARLY TRANSCENDENTALS (4th Edition*), 2019, Freeman

Additional textbooks:

- Stewart, James, CALCULUS: EARLY TRANSCENDENTALS (8TH edition), 2016, Cengage Learning

(Note: There are many suitable texts available that cover the same material at the same level. Among these are those by Finney/Thomas, Stein, Hunt and Leithold).