MATH 211 – CALCULUS II – SYLLABUS

Department of Mathematics
Millersville University

Description

A continuation of MATH 161. Topics include techniques of integration, application of the definite integral, improper integrals, parametric equations, polar coordinates, sequences and infinite series. (4 credits)

This course may be taken for general education credit (G2)

Prerequisites

C- or better in MATH 161 or MATH 163

Course Objectives

Students will learn the theory and techniques of calculus and it's applications. By the conclusion of this course the successful student will be able to:

- Apply the definite integral to find plane area, volumes, and surface areas of solids, lengths of curves, and problems arising in physics.
- Compute definite and indefinite integrals using the standard techniques of integration: integration by parts, integration of powers of trigonometric functions, trigonometric substitution, partial fraction decomposition, and selected special substitutions.
- Evaluate improper integrals.
- Determine whether a series converges or diverges using standard tests and when possible, find the sum of the series.
- Determine the radius and interval of convergence for power series.
- Construct the Taylor series expansion of given functions and apply Taylor series to make numerical approximations.
- Find parametric representations of curves on the plane, solve applied problems using these results, and apply calculus techniques to curves in parametric form.
- Calculate arc length and surface area using parametric equations.
- Determine polar coordinate representation of curves, graph curves in polar coordinates, recognize standard forms of polar coordinates, and calculate areas using integration with polar coordinates.

Assessment

Assessment of student achievement of the course objectives will vary from one instructor to another. Typical assessment will be made through work in class, homework, and examinations.

Use of Technology

Students are required to have access to a graphing calculator for this course. The department currently supports the TI 83, 84, and 86. Additionally, Millersville University students have access to the mathematical software, *Mathematica*, which may be used at the instructor's discretion.

Calculators, and technology in general, should enhance learning, and students should learn to use them appropriately. Instructors may, at times, prohibit the use of calculators with symbolic math capabilities, such as the TI-89 or TI-92. Instructors may prohibit the use of calculators on exams, as they deem appropriate.

Topics

1. Integration techniques
    a. Integration by parts
    b. Trigonometric techniques
    c. Integration using partial fraction decomposition
    d. Improper integrals
2. Applications of the definite integral
    a. Area between curves
    b. Volume using disks and washers
    c. Volume using cylindrical shells
    d. Arc length and surface area
    e. Projectile motion
    f. Applications to physics and engineering
3. Infinite series
    a. Sequences of real numbers
    b. Infinite series
    c. The integral and comparison tests
    d. Alternating series
    e. Absolute convergence and the ratio test
    f. Power series
    g. Taylor series
4. Parametric equations and polar coordinates
    a. Plane curves and parametric equations

b. Calculus and parametric equations
c. Arc length and surface area in parametric equations
d. Polar coordinates
e. Calculus and polar coordinates
f. Conic sections