

MAT 137 CALCULUS II
DEPARTMENT OF MATHEMATICS AND STATISTICS
COLLEGE OF ARTS AND SCIENCES
NORTHERN ARIZONA UNIVERSITY

MAT 137 Calculus II is a 4 credit hour course. It is the second course in the 3-semester Calculus sequence. The prerequisite is a grade of C or better in MAT 136.

During this course students should develop an understanding of the concepts of calculus which form the foundation of the course and develop skills regarding calculations, interpretations of results, and the ability to apply calculus to real-world problems.

OBJECTIVES

Upon completion of the course the students should:

1. be able to use basic integration techniques for solving definite and indefinite integrals.
2. be able to apply integration in a variety of contexts such as geometry, physics, engineering and biology.
3. be familiar with beginning concepts of differential equations and basic models involving differential equations and be able to model simple applied problems by differential equations.
4. understand the concepts of limits of sequences and sums of infinite series and of power series and be able to use theorems and convergence tests to decide convergence or divergence of sequences and series.
5. be able to demonstrate an understanding of the concepts and methodology of vectors and vector functions of one variable and be able to use vectors and vector functions to solve applied problems.
6. be able to use technology, such as computer algebra systems or advanced calculators, in solving calculus problems.

COURSE APPROACH AND COURSE POLICIES

The course will use a mixture of lecture, discussion, and group activities. The group activities will include lab sessions and lab assignments that involve the use of technology, such as computer algebra systems (e.g. Mathematica or Mathcad) or advanced calculators.

CURRENT TEXTBOOK

Calculus, Concepts and Contexts, 2nd ed., James Stewart, Brooks/Cole Publishing Co., 2001, sections 5.7 – 10.4 with some omissions corresponding to the topical list above.

COURSE CONTENT

Optional topics are listed in parenthesis.

Integration: Review of integrals including substitution and integration by parts, use of tables, approximate integration, improper integrals.

Applications of integration: Areas, volumes, arc length, average value, applications to physics and engineering, (applications to economics, biology, and probability).

Differential Equations: Basic modeling, direction fields, Euler's method, separable equations, exponential growth and decay, (the logistic equation, predator-prey systems).

Infinite sequences and Series: Sequences, series, convergence tests for series, power series, Taylor and MacLaurin series, binomial series, (applications of power series).

Vectors: 3-dimensional coordinate systems, vectors, dot product, cross product, equations of lines and planes.

Vector functions: Parametric curves and vector functions, velocity and acceleration, arc length and curvature, (tangential and normal components of acceleration, Kepler's law of planetary motion).