

MAT 238 CALCULUS III
DEPARTMENT OF MATHEMATICS AND STATISTICS
COLLEGE OF ARTS AND SCIENCES
NORTHERN ARIZONA UNIVERSITY

MAT 238 Calculus III is a 3 credit hour course. It is the third course in the 3-semester calculus sequence and covers multivariable calculus. The prerequisite is a grade of C or better in MAT 137.

OBJECTIVES Upon completion of the course, students should:

1. have an understanding of the concept of partial derivative together with related concepts and rules and be able to use these concepts in applied problems.
2. have an understanding of the definition of multiple integrals as limits of Riemann sums and be able to estimate them by Riemann sums in applied problems.
3. be able to set up multiple integrals over general regions using different coordinate systems and be able to use such techniques in applications.
4. be able to calculate multiple integrals using different coordinate systems.
5. have an understanding of the concepts and methods of vector calculus related to line integrals and surface integrals of scalar fields and vector fields and be able to use such methods in applications.

COURSE CONTENT (Optional topics are listed in parenthesis.)

Partial derivatives: Surfaces, functions of two or more variables, contour diagrams, partial derivatives, tangent planes and linear approximation, chain rule, directional derivatives and the gradient vector, maximum and minimum values, method of Lagrange multipliers, (higher order Taylor approximations, partial differential equations).

Multiple integrals: Double integrals and iterated integrals over rectangles and over more general regions, introduction to polar coordinates, double integrals in polar coordinates, triple integrals in rectangular, cylindrical, and spherical coordinates, (surface area, general change-of-variables theorem for double integrals).

Vector calculus: Vector fields, line integrals, conservative vector fields and fundamental theorem for line integrals, Green's theorem, curl and divergence, parametric surfaces, surface integrals, Stokes' theorem, divergence theorem.

CURRENT TEXTBOOK

Calculus, Concepts and Contexts, by James Stewart, Brooks/Cole Publishing Co.,1998, sections 9.6, 9.7, 10.5 - 13.9 with some omissions corresponding to the topical list above.