MATH 228
Calculus III

Prerequisites

MATH 227 with a grade of C or better.

Bulletin Description

The third semester of Calculus: vectors, the geometry of three-dimensional space, vector valued functions, partial derivatives, multiple integration, vector calculus.

Course Objectives

The main objective of Calculus III is for students to learn the basics of the calculus of functions of two and three variables. They will study vectors and Euclidean geometry in three-dimensional space, vector valued functions, partial derivatives, the gradient vector, Lagrange multipliers, double and triple integrals and line integrals, culminating with Green's Theorem. They will also apply these ideas to a wide range of problems that include motion in space, arc length, curvature and optimization. The students should be able to interpret the concepts of Calculus algebraically, graphically and verbally.

More generally, the students will improve their ability to think critically, to analyze a problem and solve it using a wide array of tools. These skills will be invaluable to them in whatever path they choose to follow, be it as a mathematics major or in pursuit of a career in one of the other sciences.

Students will be required to attend a two-hour laboratory every week, where they will study selected topics.

Upon successful completion of the course, students should be able to

- Solve problems involving lines and planes in three-dimensional space
- Differentiate functions of two and three variables
- Evaluate double and triple integrals and line integrals
- Apply derivatives and integrals to problems of motion, arc length, curvature and optimization
- Apply Green's Theorem to evaluate line integrals
- Determine when a planar vector field is conservative

Evaluation of Students

Students will be evaluated on their ability to devise, organize and present complete solutions to problems. While instructors may design their own methods of evaluating student performance, these methods must include in-class examinations, frequent homework assignments and a final exam.

Course Outline

Topics	Number of Weeks
Vectors and the Geometry of Space	3
Vector Functions	Lab
Partial Differentiation	5
Multiple Integration	4.5
Vector Calculus	2.5

Textbooks and Software

Calculus, Early Transcendentals, by James Stewart (4th edition)
Mathematica

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