MA 227 Calculus III

Syllabus*

Course Description

The course includes vectors and the geometry of space; vector functions and functions of several variables; partial derivatives; local linearity; directional derivatives; the gradient; differential of a function; the chain rule; higher order partial derivatives; quadratic approximation; optimization of functions of several variables;parametric curves and surfaces; multiple integrals and their application; vector fields; line and surface integrals; vector calculus.

Prerequisites MA 126.

Textbook

Jon Rogawski, *Calculus: Early Transcendentals*, W. H. Freeman, New York, 1st edition (2008). ISBN-13: 978-1-4292-1073-7

Topics & Time Distribution

By assuming the total of 13 weeks, the instructor is given an extra week and a half to use for tests, emphasis on certain topics, etc.

Chapter 12:	Vector Geometry	2.5 weeks
Chapter 13:	Calculus of Vector-Valued Functions	1.5 weeks
Chapter 14:	Differentiation in Several Variables	3 weeks
Chapter 15:	Multiple Integration	2.5 weeks
Chapter 16:	Line and Surface Integrals	2 weeks
Chapter 17:	Fundamental Theorems of Vector Calculus	1.5 weeks

Detailed Schedule

Below are the essential sections which should be covered by all instructors.

Chapter 12: 12.1–12.7

Chapter 13: 13.1–13.5

Chapter 14: 14.1–14.8

Chapter 15: 15.1–15.5

Chapter 16: 16.1–16.5

Chapter 17: 17.1–17.3

*Last updated May 2009

Learning Objectives

Upon successful completion of the course a student will:

- be fluent in the algebra and geometry of vectors in 2– and 3–dimensional space, and have an understanding of vector fields;
- understand the calculus of a single variable from a vector point of view, including an understanding the differential calculus of curves in 3-dimensional space and the calculus of path integrals, as well as applications of both of these;
- understand the notion of a conservative vector field and a potential function and be able to state and use the fundamental theorem of line integrals;
- be familiar with elementary functions of several variables, their graphs, and the standard quadric surfaces;
- be able to compute partial and directional derivatives of multivariable functions and use these to compute maxima and minima and tangent plane approximations;
- be able to compute double and triple integrals in various coordinate systems;
- be able to state and use Green's theorem;
- have a conceptual and computational understanding of surface integrals and their applications;
- be able to state and use Stokes' theorem and the divergence theorem.