Math 225 Multivariable Calculus and Analytic Geometry II Spring 2012

Instructor	Amites Sarkar
Text	Calculus: Multivariable (5^{th} ed.) Hughes-Hallett et al.
Calculator	TI-85 or higher

Course content

This course is a continuation of Multivariable Calculus I (MATH 224). We will cover Sections 16.3, 16.5, 16.7 and Chapters 17–20 of the book. The two main themes are **analytic geometry** and **vector calculus**. Vector calculus is central to many areas of theoretical physics: for instance, **Maxwell's equations**, connecting electric and magnetic fields, are written in the language of vector calculus.

Some of the most useful tools in vector calculus are **Green's theorem**, **Stokes' theorem** and the **Divergence theorem**. These are generalizations of the fundamental theorem of calculus. We will spend much time understanding and applying these theorems.

Exams

Midterm 1	Friday 20 April
Midterm 2	Friday 18 May
Final	Tuesday 5 June 8–10 am

Grading

The midterms are each worth 20%, and the final is worth 30%. In addition, there will be six 30 minute quizzes on 30 March, 6 April, 27 April, 4 May, 11 May, and 25 May, which are worth 5% each. If you feel too ill to take an exam, don't take it, but bring a doctor's certificate to me when you feel better and I will make arrangements.

Office hours

My office hours are 3–3:50 on Mondays, Tuesdays, Thursdays and Fridays, in 216 Bond Hall. My phone number is 650 7569 and my e-mail is amites.sarkar@wwu.edu

Course Objectives

The successful student will demonstrate:

1. Understanding of the analytic ideas behind the definite integral of a multivariable function, including its definition as a limit of Riemann sums.

2. Competence in the computation of multiple integrals, including integration in cylindrical and spherical coordinates, and the ability to choose a convenient system of coordinates.

3. Ability to use parametrization to represent curves and surfaces.

4. Ability to use parameterizations of curves to study the motion of a particle and to solve geometric problems.

5. Understanding of the basic concept of a vector field, and familiarity with examples of vector fields.

6. Ability to determine whether a vector field is the gradient of a function, and, if so, the ability to find such a function.

7. Competence in the use of Green's theorem, Stokes' theorem and the Divergence theorem.

8. Understanding of the analytic ideas and of the geometrical and physical interpretations of line and flux integrals.

9. Competence in the computation of line and flux integrals.

10. Competence in the computation of the divergence and the curl of a vector field, and understanding of their physical interpretations.

Relation to Overall Program Goals

Among other things, this course will (i) enhance your problem-solving skills; (ii) help you recognize that a problem can have different useful representations (graphical, numerical, or symbolic); (iii) increase your appreciation of the role of mathematics in the sciences and the real world; (iv) inform you about the historical context of the area of mathematics studied.