MATH 241 (Section 5) – Vector Calculus

Instructor Professor Doug Meade

Office Hours: TTh 10:00 – 11:00 and 1:45 – 2:45 and by *prior* appointment
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Meeting Times TTh 12:30PM– 1:45PM, LC 405

Text Dale Varberg and Edwin J. Purcell, *Calculus*, Seventh Edition Prentice Hall, 1997.

Prerequisite Completion of MATH 142 with a grade of C or better; or consent of the Mathematics Department.

Overview The main topics in this course are the same as in the first two courses in this sequence: limits, derivatives, integrals, and applications of these concepts. The new component of this journey is that the functions depend on more than one variable and/or are vector-valued. To make sense of general n-space, we start with a basic introduction to two- and three-space.

Differential calculus in n-space is very similar to that in one variable. The same rules will be used and we will be able to solve many optimization problems.

Integral calculus in n-space is fundamentally quite different in n-space. Instead of integrating over an interval, we can think about integrating over a 2-d region of the plane, a 3-d solid in 3-space, along a line, or over the surface of a solid. The fortunate aspect of this is that, when thought about in the proper way, each of these types of integrals can be evaluated using our standard one variable methods. We will work to develop a proper understanding of these integrals. Another component of understanding these integrals is knowing what the theorems of Green, Gauss, and Stokes say and how to use them.

Course Content Chapters 13 — 17 of the text correspond to this material. Here is a breakdown of the major topics in each chapter.

Chapter 13: Geometry in Plane, Vectors
- 2-d vectors
- vector-valued functions
- curvilinear motion

Chapter 14: Geometry in Space, Vectors
- 3-d vectors and the cross product
- surfaces
- cylindrical and spherical coordinates

Chapter 15: The Derivative in n-Space
- partial derivatives
- directional derivatives and gradients
- optimzation and Lagrange multipliers

Chapter 16: The Integral in n-Space
- double and triple integrals
- iterated integrals
- surface integrals

Chapter 17: Vector Calculus
- line integrals and independence of path
- Green's Theorem
- Gauss' Divergence Theorem
- Stokes' Theorem

Grading Your grade in this course will be based on your performance on homework, two (2) mid-term exams, and a final exam. The weights assigned to each of these components will be:

Homework	25%
Mid-term exams (2)	50%
Final exam	25%

Course grades will be determined according to the following scale:

A	90 –100
B	80 – 89
C	70 – 79
D	60 – 69
F	0 – 59

Note that the deadline to drop this course with a grade of W is Monday, February 26, 2001.

Exams There will be two (2) exams during the semester. *Tentative* dates and topics for these exams are:

Tuesday, February 20
Tuesday, April 24

There will be no make-up exams. If you miss one exam due to a documented reason of illness, family emergency or participation in a University sponsored event, your score on the final exam will be used to replace the missing exam score. Excuses such as oversleeping, forgetting the time or location of the exam, and lack of studying are explicitly noted as unacceptable grounds for missing an exam.
A comprehensive final will be given at 2:00PM on Friday, May 4, 2001.

Homework Homework problems will be announced for each section that we discuss. The assigned problems will be collected each week, typically on Thursday. You will have an opportunity to ask questions before the homework problems are collected, particularly on Tuesdays. Homework papers are collected at the beginning of the class in which they are due. Your homework grade will be determined from your nine (9) highest homework scores.
No late homework will be accepted for a grade.

Study Hints Before each class, you should both review the material from recent sections and read the section to be discussed that day. This will allow you to both understand my presentation of new material and identify questions that you have about earlier material.

Attendance Regular class attendance is important. Consistent with the USC Undergraduate Bulletin, a grade penalty may be applied to any student missing more than four classes (10%) during the semester.

Academic Honesty Cheating and plagiarism will not be tolerated in this course. You are encouraged to discuss homework problems with others. Violations of this policy will be dealt with in a manner consistent with University guidelines.