Syllabus
Math 251, Section 201: Multivariable Calculus
Fall 2008, MWF 11:00 am –12:05 pm, MP 101

Instructor: Dr. Minkoff
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Office Hours: Mondays 2:30–3:30 pm or by appointment.

Prerequisite: Grade of C+ or better in Math 152 (or a comparable course). Note that success in this course is highly correlated to grades in Calculus I and II. If you received a grade below a C+ in either of those courses you should consider retaking Calculus I or II before taking this course.

Text: *Multivariable Calculus*, Third Edition, by Smith and Minton. Publishers: McGraw Hill, 2007.

The course will cover Chapters 10–14.

Grades:

Homework	15%
Test 1	20%
Test 2	25%
Quiz	10%
Final Exam	30%
Total	100%

Calculators: You are allowed to use calculators and software tools such as Mathematica, Maple, and Matlab on your homework assignments. However, since the exams are designed to test your *understanding* of the underlying concepts covered in this class, *calculators will not be permitted (or necessary) for use in the exams.*

Homework: There will be one homework due every week on Wednesday. Homework is to be turned in at the START of class on Wednesday or can be slipped under my office door *prior* to class on Wednesday if you must miss class for some reason. *Late homework will not be accepted.* However, your two lowest homework grades will not count towards calculation of your final grade. Whenever possible, homework will be graded and returned within one week of being collected.

The grader will check that all homework assigned has been done, but will only carefully grade selected problems. Please note that the homework constitutes a substantial portion of your overall grade. In order to learn the concepts and be able to apply them to solving problems on exams, etc., you are strongly encouraged to devote as much time as possible to working the homework problems. I encourage you to discuss the homework assignments with other students in the class.

However, I expect the homework you submit for grading to be written up by you alone.

Tests: There will be two in-class (hour) tests (not including the final exam) and one half-hour quiz. No make-up exams will be given except *possibly* in the case of a serious emergency. In such a case I *must* be notified *in advance*. There will be no exceptions to taking the final exam at the date, time, and place specified by the University (Friday 12/12/08 from 10:30 am – 12:30 pm in MP 101). The final exam will be comprehensive.

Learning Goals and Course Motivation: Multivariable or Vector Calculus is an undergraduate course that generalizes the concepts you learned in first and second semester Calculus to higher dimensions. Specifically you will learn what it means to integrate and differentiate functions that have domains or ranges not in $\Re$ but in $\Re^n$. These concepts form the basis for a huge field of mathematics – the study of partial differential equations (pde's). PDE's are equations that model most of the interesting physical phenomena encountered in science and engineering (just a few examples include the propagation of light and sound waves through the air or earth, the flow of fluids in a reservoir or aquifer, etc). It is essential that you master the concepts in this course in order to be able to deal with models found in the physical world (we live in three space dimensions).

Specifically, in this course you will:

1. Review vector arithmetic learning how to add and multiply vectors.
2. Because it is rare that one can solve equations found in the real world exactly, approximate solutions usually suffice. The concept of distance is essential in many engineering studies in which one needs to know how accurate an approximate solution is, and hence, being able to measure distances between vectors is a fundamental concept in this course.
3. You will learn how to describe some basic surfaces (planes, cones, cylinders, etc) which will be used as motivating examples on which to integrate and differentiate functions later. And you will learn different ways to describe the same surface or object.
4. We will explore the concepts of velocity and acceleration that arise with vector-valued functions.
5. In first semester calculus you defined both the derivative and integral in terms of limiting processes (as some quantity went to infinity). In higher dimensions the idea of approaching "from both sides" becomes more complex. You can approach a point along an infinite number of directions in two dimensional space. Hence you will learn what it means to take derivatives, find limits, and approximate functions that have multiple arguments (ie, the domain of the function is no longer just the real line).
6. You will discover how to optimize functions that depend on several variables both when the function to be optimized has constrained resources and when the function is unconstrained.
7. You will learn how to integrate functions over domains that live in higher dimensions (ie, are not just intervals of the real line).
8. And you will learn basic physical rules that relate the integral of a function on the interior of a domain to the value of the function on the boundary (ie, higher dimensional generalizations of the Fundamental Theorem of Calculus).

Academic Conduct:
I take academic dishonesty *very seriously* and will not tolerate it in this class in any form. Academic misconduct includes willfully cheating on or giving aid during an exam or copying homework assignments (from the web, from eachother, or from a solutions manual). Blatant copying on an exam, homework assignment, or computer assignment will result in a grade of zero for that work.

The university now stipulates that the following be included in all class syllabi:

By enrolling in this course, each student assumes the responsibility of an active participant in UMBC's scholarly community in which everyone's academic work and behavior are held to the highest standards of honesty. Cheating, fabrication, plagiarism, and helping others to commit these acts are all forms of academic dishonesty, and they are wrong. Academic misconduct could result in disciplinary action that may include, but is not limited to, suspension or dismissal.

To read the full Student Academic Conduct Policy, consult the *UMBC Student Handbook*, the *Faculty Handbook*, the *UMBC Integrity webpage* www.umbc.edu/integrity, or the *Graduate School website* www.umbc.edu/gradschool.

Class Attendance: I expect students to attend class and to turn up **on time**. Rarely do students do well in classes which they do not attend, and I will be less likely to give outside assistance to students who regularly miss class. Further, students arriving late for class disrupt the entire class. Students who consistently turn up more than a few minutes late for class or who regularly miss class will be docked points from their final grade.

Email: I am happy to answer questions about the class via email. However, it is much better for you if we can talk in my office at the board. Answers given over email will be brief and intended merely to answer your direct question rather than to explain concepts. I reserve the right not to respond to email if I feel it would be best for the student to discuss his/her question in person during my office hours.

Important Dates:

Date	Notes
8/27/08	First day of class
9/1/08	Labor Day Holiday
9/10/08	Last day to register
9/19/08	First Hour Exam
9/24/08	Last day to drop class (without "W" on transcript)
10/24/08	Second Hour Exam
11/5/08	Last day to drop class
11/17/08	Quiz
11/27–28/08	Thanksgiving Break
12/9/08	Last day of classes
12/12/08	Final Exam