Math 2130 — Honors Multivariable Calculus

Instructor Information

Instructor:	Ben Salisbury, Teaching Assistant
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Office Hours:	Tuesdays and Thursdays 12:30–2:00pm or by appointment

Course Information

The subject matter of Math 2110 in greater depth, with emphasis on the underlying mathematical concepts. The description of Math 2110 is: "Two- and three-dimensional vector algebra, calculus of functions of several variables, vector differential calculus, line and surface integrals."

- **Text**: Williamson and Trotter, *Multivariable Mathematics*, Fourth Edition, Pearson Education, 2004.
- **Meeting Time and Location**: MWF 12:30–1:45pm in MSB 403.

Course Downloads

It was requested that I upload scanned copies of my notes from class. Be weary that there may be typographical errors in my notes, as well as symbols that you are not familiar with (because these notes are for my reference, so I may use tools and terminology that come after multivariable calculus). Also, there may be an instance in class that I decide not to do exactly as I wrote. My point is, your notes should serve as your primary reference, and these as a backup.

Notes through exam 1	Notes between exams 1 and 2	Notes after exam 2
Section 1.1 Section 1.2 Section 1.3 Section 1.4 Section 1.5 Section 1.6 Section 3.1 Section 3.2	Section 6.1 Section 6.2 Section 6.3 Section 6.4 Section 6.5	Section 8.1 Section 8.2 Section 8.3 Section 8.4

Grading Breakdown

Homework	Due Friday after assigned	15%
Project	Will be discussed later (either computer project or presentation)	10%
Exam 1	Friday, October 8	20%
Exam 2	Friday, November 5	20%
Final Exam	**Wednesday, December 15 from 1–3pm**	35%

Course Outline

Week	Date
1.1	Coordinate Vectors
1.2	Geometric Vectors
1.3	Lines and Planes
1.4	Dot Products
1.5	Euclidean Geometry
1.6	The Cross Product
3.1	Linear Functions on n-dimensional Space
3.2	Vector Spaces
4.1	Functions of One Variable
4.2	Several Independent Variables
4.3	Partial Derivatives
4.4	Parameterized Surfaces
5.1	Limits and Continiuty

5.2	Real-valued Functions
5.3	Directional Derivatives
5.4	Vector-valued Functions
6.1	Gradient Fields
6.2	The Chain Rule
6.3	Implicit Differentiation
6.4	Extreme Values
6.5	Curvilinear Coordinates
7.1	Iterated Integrals
7.2	Multiple Integrals
7.3	Integration Theorems
7.4	Change of Variable
7.5	Centroids and Moments
7.6	Improper Integrals
8.1	Line Integrals
8.2	Weighted Curves and Surfaces of Revolution
8.3	Normal Vectors and Curvature
8.4	Flow Lines, Divergence, and Curl
9.1	Green's Theorem
9.2	Conservative Vector Fields
9.3	Surface Integrals
9.4	Gauss' Theorem
9.5	Stokes' Theorem
9.6	The Divergence, Curl, and Laplacian Operators

Homework Assignments

You will be assigned problems from the text each Friday, which you will be expected to you hand in at the beginning of class the following Friday. ***No late homework assignments will be accepted***. Moreover, homework must be neat and in the order the problems were assigned. Part of being a college student is learning to be professional, so your homework should be treated as a formal report that you would hand in at a job.

Due Date	Assignment

9/10/10	[Set 1](#)	[Solutions](#)	
9/17/10	[Set 2](#)	[Solutions](#)	
9/24/10	[Set 3](#)	[Solutions](#)	
10/1/10	[Set 4](#)	[Solutions](#)	
10/6/10	[Set 5](#)	[Solutions](#)	
10/22/10	[Set 6](#)	[Solutions](#)	
10/29/10	[Set 7](#)	[Solutions](#)	[Student Solutions](#)
11/3/10	[Set 8](#)	[Solutions](#)	
11/19/10	[Set 9](#)	[Solutions](#)	
12/3/10	[Set 10](#)	[Solutions](#)	
12/10/10	[Set 11](#)	[Solutions](#)	

Flash Applets

These are collection of math applets created in Flash by a former professor of mine from the University of Rhode Island, [Barbara Kaskosz](#). These are extremely helpful when trying to visualize certain aspects of calculus. The applets below pertain directly to multivariable calculus, but there are additional resources at [www.flashandmath.com/mathlets](#). You will need to download a [Flash player](#) in order to use.

[Contour Diagram Grapher](#) [Implicit Equations Grapher](#)

[3D Function Grapher](#) [Parametric Surfaces in Rectangular Coordinates](#)

[Parametric Surfaces in Spherical Coordinates](#) [Parametric Surfaces in Cylindrical Coordinates](#)

[Spherical Coordinates Interactively](#) [Double Integrals](#)

[Parametric Curves in 3D](#)