Math 334, (Honors) Advanced Calculus

Lecture:	MTWTh 10:30, MEB 245
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Text:	*Advanced Calculus* (required)
Author:	Gerald B. Folland
Text:	*Mathematical Thinking* (required)
Authors:	John P. D'Angelo & Douglas West

Math 334-5-6 is a sequence designed to cover portions of the content of Math 300, 309, 324, 326, 327, 328, and 427. We will take a more critical point of view in studying these topics than would be usual in the courses just mentioned. By that I mean we will try to understand definitions, theorems, and proofs of some results. We will not prove everything but will try to get a deeper understanding than simply results from a formal use of mathematical techniques. I will try to motivate our study by mentioning some of the big problems that have led to the development of the topics we will study.

In Math 334 I plan to cover the following and related topics:

1. Mathematical reasoning

2. Elementary topology of $\mathbf{R}^n$

3. Functions of several real variables

4. Derivatives of functions of several variables

5. Curves and surfaces in $\mathbf{R}^3$
6. Integrals of functions of one and several variables
7. Line and surface integrals
8. Green's theorem, divergence theorem, Stokes' theorem

We will cover portions of Chapters 1-5 of Folland and Chapters 1-4 of D'Angelo and West. Some of Math 334 will be a review of subjects that you have already studied, so I hope to consolidate your understanding of these topics. You will find that each level of mathematics typically builds on prior levels and incorporates a review of earlier material.

Homework will be collected at regular intervals and will count 20% of the course grade. There will be two 50 minute midterm tests which will count 20% of the course grade. The midterm tests will be closed book but you will be allowed to bring notes on one side of a notebook size sheet of paper. There will be a two hour closed book final exam which will count 40% of the course grade. For the final you will be allowed to bring notes on both sides of a notebook size sheet of paper. Calculators will not be allowed.

Classroom participation is encouraged. I encourage you to interrupt me with a questions. I probably won't give you an instant answer. I would like for you to understand that mathematics does not consist of one minute answers to one minute questions. You should not feel that every problem has a brief solution (or even any solution). Math is not simply arithmetic. After many days (months?, years?) of thought you may find an elegant simple explanation to some problem. It might also happen that by luck you leap to the right explanation. In any case do not be discouraged if you have difficulties. The best tactic is to keep thinking. Faulty ideas are much better than no ideas. You may have only one good idea for every hundred ideas. That's a good ratio.

I will attempt to keep to the following schedule, however I suspect it is too fast and I will make adjustments throughout the quarter.

WEEK	SECTIONS
I	Folland: 1.1-1.5
II	Folland: 1.6-1.8, 2.1
III	Folland: 2.1-2.4, D'Angelo & West: Chapter 1
IV	Folland: 2.5-2.7
V	Folland: 2.8-2.10, D'Angelo & West: Chapter 2
VI	Folland: 3.1-3.4, 4.1
VII	Folland: 4.1-4.2
VIII	Folland: 4.3-4.5, D'Angelo & West: Chapter 3
IX	Folland: 4.6-4.7,5.1
X	Folland: 5.2-5.4, D'Angelo & West: Chapter 4
XI	Folland: 5.5-5.8

Here are the homework assignments:

DATE	ASSIGNMENT
Sept. 29	Folland §1.1: 4, 5; §1.2: 5, 6, 8; §1.3: 3, 4, 7; §1.5: 3, 4, 5, 6
Oct. 6	Folland §1.6: 1, 2; §1.7: 2, 4, 9; §1.8: 1, 2, 4
Oct. 13	Folland §2.1: 1, 2, 3, 9; §2.2: 6, 7; §2.3: 3, 4
	D'Angelo & West: 1.24, 1.25, 1.31
Oct. 20	Folland §2.4: 2; §2.5: 6, 7; §2.6: 7, 8, 9; §2.7: 3, 4;
Oct. 23	**MIDTERM**
Oct 27	Folland §2.8: 1fh; §2.9: 6, 11, 17, 18; §2.10: 5, 7
Nov. 3	Folland §3.1: 2, 5, 6; §3.2: 2, 4; §3.3: 2, 6; §3.4: 4
	D'Angelo & West: 2.27, 2.29, 2.33
Nov. 9	Folland §4.1: 1, 5, 6, 7; §4.2: 2, 3, 4, 6
Nov. 17	Folland §4.3: 5, 10, 13; §4.4: 10, 13, 14; §4.5: 1, 3, 5, 6
	D'Angelo & West: 3.39, 3.58, 3.62
Nov. 20	**MIDTERM**
Nov. 22	Folland §4.6: 1D, 2B, 3F, 4, 8; §4.7: 3; §5.1: 2, 5c, 6a
Dec. 1	Folland §5.2: 2, 4, 6; §5.3: 2, 4, 5, 7; §5.4: 2c, 3, 8, 9
	D'Angelo & West: 4.17, 4.33, 4.46
Dec. 6	Folland §5.5: 2, 3, 4, 5, 6, 7; §5.6: 1, 2, 4;
	§5.7: 1, 6, 8; §5.8: 1ac, 2a, 3, 4
Dec. 8	8:30-10:20 a.m., **FINAL EXAM**

These assignments are due at the *beginning* of class on the due date.