Math 2144 – Advanced Calculus IV

Description: A rigorous treatment of the mathematics underlying the main results of multivariable calculus. Intended for students with strong interest and ability in mathematics who have taken 2143 (May be taken for honors credit but open to any qualified student.)
Prerequisites: MATH 2143 or consent of instructor.

Instructor: Luke Rogers

Basics

Instructor: Luke Rogers
Instructor's Office Hours: Tuesdays 11:30am-12:30pm, Thursdays 10-11am and 2-3pm in MONT 339
Lectures: Tuesdays and Thursdays, 12:30-1:45pm and Fridays 12:20-1:10pm in MONT 226.
Textbook: Calculus Volume 2 (2nd Ed.) by Thomas Apostol**.**
Grading Scheme: Homework and class participation 30%, Midterm 30%, Final 40%.

What is expected of you

This is a difficult class. It requires quite a lot of work from you, most of which will occur outside the classroom. My main expectations are that

- You read the material before each class. This includes attempting to understand the concepts and trying the problems on your own. A schedule of the course material is available.
- You complete your homework
- You ask questions in class and actively participate in learning.
- You come to see me at my office hours if you are having difficulties with the material, are bored, want more (or less) work, would like to know more about the topics, or have any questions about the class. In my experience, the students who do this are the ones who do well in the class.

Academic Integrity

The University of Connecticut expects that its students will adhere to a high level of integrity in their academic work. You may find information about the academic integrity policy as it pertains to students at http://community.uconn.edu/the-student-code-appendix-a/

University Services

The university has many services that may provide support if you are having difficulties in or

outside the classroom. Here is a useful list of resources for UConn students.

Schedule

We will begin by completing the work we were doing in Chapter 12 of Apostol Vol 2 last semester. Then we will go back to linear algebra to discuss eigenvalues and eigenvectors and their connection to quadratic forms (Chapters 4 and 5) and applicability to max-min problems in several variables (Section 11 of Chapter 9). We then look at differential equations, covering most of Chapters 6 and 7.

Planned schedule and reading is in the table below.

Date	Day	Sections to Read
01/17/17	Tuesday	Review of Chapter 12 material done last semester
01/19/17	Thursday	12.7-12.9
01/20/17	Friday	12.11-12.12
01/24/17	Tuesday	12.14
01/26/17	Thursday	12.16
01/27/17	Friday	12.18
01/31/17	Tuesday	12.19
02/02/17	Thursday	12.20
02/03/17	Friday	Examples
02/07/17	Tuesday	Review linear transformations, 4.1
02/09/17	Thursday	4.2-4.5
02/10/17	Friday	4.6-4.8
02/14/17	Tuesday	4.9
02/16/17	Thursday	5.1-5.4
02/17/17	Friday	5.6
02/21/17	Tuesday	5.7-5.9
02/23/17	Thursday	5.10-5.12
02/24/17	Friday	5.13
02/27/17	Tuesday	5.16-5.19
03/02/17	Thursday	Application (review 9.10), read 9.11
03/03/17	Friday	6.1-6.5
03/07/17	Tuesday	6.6-6.8
03/09/17	Thursday	MIDTERM
03/10/17	Friday	Midterm postmortem
03/14/17	Tuesday	SPRING BREAK
03/16/17	Thursday	SPRING BREAK
03/17/17	Friday	SPRING BREAK
03/21/17	Tuesday	6.10-6.12
03/23/17	Thursday	6.13-6.14
03/24/17	Friday	Examples
03/28/17	Tuesday	6.17-6.18
03/30/17	Thursday	6.19-6.20
03/31/17	Friday	6.22, we will also discuss the Gamma function (from 6.23)
04/04/17	Tuesday	7.1-7.5
04/06/17	Thursday	7.6-7.9
04/07/17	Friday	7.10
04/11/17	Tuesday	7.11-7.13
04/13/17	Thursday	7.14-7.15
04/14/17	Friday	7.16
04/18/17	Tuesday	7.18-7.19
04/20/17	Thursday	7.21-7.22
04/21/17	Friday	7.23
04/25/17	Tuesday	7.25-7.27
04/27/17	Thursday	7.28-7.29
04/28/17	Friday	

Homework

Most of what you learn in this course will be the result of working exercises that are designed to reinforce key concepts, develop skills, and test your understanding of the material. There will be textbook exercises due at the end of every week on lecture material. Some of the exercises are straightforward, others are very complex.

In general homework is due every Friday. Late homework will not be accepted. Although it should be done daily, it will only be collected once per week, on Friday in class. The first assignment is due on Friday, Jan 27th.

You are encouraged to talk with your classmates about the homework. If you have difficulties, do not waste time --- get help! Please come to office hours!

Late homework will not be accepted. I expect full answers, with explanations and complete proofs. If you have used some source in order to solve a problem (a book or a website) then make sure to cite your references.

The homework is the most important part of the course. No matter how well you think you understand the material presented in class, you won't really learn it until you do the problems.

Due Date	**Homework Set**	
01/27/17	• Page 429: 4,5,8,10 • Page 436:1,4,7 • Page 442: 2,4,6,8	
02/03/17	• Page 447: 2,3,9	
02/10/17	• Page 462: 1,2,6,7	
02/17/17	• Page 101: 1,2,4,7,9,11,12 • Page 107: 1,6,7,9, 13, 14.	
02/24/17	Page 112: 2,4,5,6,7,8 • Page 118: 1,3,5,6,7,10	
03/03/17	• Page 126: 1,5,8,9,11,14 • Page 134: 3,7	
03/10/17	• Page 141: 2,3,5	

	• Page 314: 23, 25	
03/24/17	• Page 145: 2,8,12 • Page 154: 1,3,6,11,15(d,f,h),20	
03/31/17	• Page 166: 2,8,10,12,15,18	
04/07/17	• Page 178: 2,4,6,8,9	
04/14/17	• Page 195: 2,3,5,7,9,10 • Page 205: 2,4,5,8,11	
04/21/17	• Page 211: 2,5,6,8,12 • Page 215: 3,4,5,8,11	
04/28/17	• Page 222: 4 • Page 230: 1,2,5,7,9,10	

Advice on Reading a Math Book

You are expected to read the appropriate sections of the book **before** lecture, according to the schedule provided. You'll also be reading the book when you're working on homework problems and studying for exams and quizzes.

Here are some tips on how to read the book:

- *Always have pen and paper handy when reading*. Check all the calculations. Fill in the details when they're left out. Keep track of your ideas and questions as you're reading. Keep working without even looking at the book.
- *Give yourself the time and energy to do the reading*. Reading a math book is not like reading a novel. It takes more time and energy. You'll need a reasonable block of time and an active mind to get something out of it.
- *Work the examples without looking at the solutions*. Learning mathematics is never a passive experience. The best way to make use of example problems in the book is to start them on your own without looking at the solution. If you're stuck or confused, you should peek a little bit at the solution, and then try to finish the rest yourself.
- *Math books follow a logical order*. Remember that each sentence, paragraph, and page usually depends on the previous one. If you don't understand something, you should be

hesitant about continuing on until you do. It is usually a good idea to first skim for an overview to catch key ideas, then reread with concentration.