

Of course, when you were working in Euclidean space, in Math 3210-3220, you were used to writing this in the “norm” notation

$$\|P - Q\| \leq \|P - R\| + \|Q - R\|.$$

A space which has a distance function satisfying a triangle inequality is called a metric space, and analysis related to metric spaces is another main focus of our study this semester. You should think of metric spaces as a useful abstraction which allows one to understand the mathematics which arise in a number of different scientific venues, much as the vector space abstraction which you see in linear algebra allows you to distill mathematics which is common to many disciplines. I plan to begin this course with a review of the real numbers, chapter 2, and then to proceed to metric spaces, chapter 9. As we move through chapter 9, and after we have finished it, we will pursue interesting applications from chapters 7, and 10-13. We will finish the course by studying the Lebesgue integral, chapter 14 and supplemental material.

Of course this a mathematics offering so sometimes we will forget that what we are doing is related to science and only concentrate on its intrinsic mathematical beauty. But hopefully we will also see how our abstractions can be applied.

prerequisite: Math 3210-3220, Foundations of Analysis. This sequence is a prerequisite not only because of the analysis treatment, but because of the focus on proofs and logic; you will be expected to learn definitions and proofs in Math 5210, and to come up with your own proofs on homework and tests. Most of the material from 3210-3220 is contained in chapters 1-8 of Strichartz, in case you’re rusty. In particular you should immediately make sure you’re comfortable with the preliminary material in Chapter 1.

grading: There will be one midterm and a comprehensive final examination. I plan for the midterm to be taken in class Wednesday March 11, and for the final to be given in our classroom at the University time, Wednesday May 6, 1-3 p.m. There will also be graded homework, which I plan to assign daily and collect on the following Friday. Homework will count 40% of your grade, the midterm will count 20%, and the final will count for 35%. You can earn the remaining 5% of your grade by meeting with me for 15 minutes or so during the first two weeks of the course, so that we can get (re)acquainted.

It is the Math Department policy, and mine as well, to grant any withdrawal request until the University deadline of Friday March 6

ADA Statement: The American with Disabilities Act requires that reasonable accommodations be provided for students with physical, sensory, cognitive, systemic, learning, and psychiatric disabilities. Please contact me at the beginning of the quarter to discuss any such accommodations for the course.