UConn Math 3151 Section 001 – Analysis II
Spring 2016 Syllabus

Basic Information

Instructor: Luke Rogers
Instructor's Office Hours: Tuesdays, 10am-Noon in MSB 414, or by appointment.
Lectures: Tuesdays and Thursdays, 2:00- 3:15pm in Engineering Building 2 Room 323.
Grading Scheme: Quizzes 30%, Midterm 30%, Final exam 40%.
Textbook: Material delived in lectures will be supplemented by references to Tom Laetsch's notes and possibly some later chapters of John Hutchinson's notes.
Other potentially useful texts: Texts freely available online include Trench's Real Analysis and Thomson, Bruckner and Bruckner, while traditional texts include Protter and Morrey's "A First Course in Real Analysis", Strichartz's "The Way of Analysis" and Wade's "Introduction to Analysis".

Course Content

Analysis II is listed in the catalog as a continuation of Analysis I to the case of functions of several variables. There are two main pieces to generalizing single-variable differential calculus in this manner, namely some linear algebra and some machinery for handling limits in several variables. However there is considerable benefit in making more substantial generalizations which make the ideas more clear and the material more interesting. For this reason we look at limits, continuity and compactness on metric spaces, which are just sets with a distance structure, and instead of studying just the linear algebra we need in finite-dimensional spaces we also look at some basics from the infinite-dimensional setting (this latter is the basis of the area called functional analysis, which is covered more thoroughly in the sequence Math 5130-5131).

Generalizing integral calculus presents somewhat different challenges. The Riemann integral you met in Math 3150 has significant limitations, particularly with regard to the situation in which one wants to exchange a limit of integrands for a limit of integrals; on the real line it can be substantially improved by introducing the Lebesgue integral, for which there is also a product version in the case of several variables. This, and other concepts of measure theory, are covered in Math 5111. There is also the question of obtaining a Fundamental Theorem of Calculus in several variables. It turns out that the correct objects to integrate for such a theory are not functions but differential forms, and this material is often covered in a first course on differential geometry, e.g. Math 3370. We will discuss some basics of both of these aspects of integration; the depth to which we explore them will depend on the time available.

Class by class plan of material to be covered

I plan to regularly update a the following Plan of material to be covered, including homework assignments so that you can easily tell what you should be reading to prepare for class and what work you should be planning to hand in. If this file is not up-to-date please let me know in case there is a problem with my updates on the server.

Homework, Quizzes and Exams

Mathematics can only be fully learned by doing. For this reason weekly homework will be assigned. You are expected to do this homework, though it will not be collected for grading. However there will be weekly quizzes that will be very closely connected to the homework and many exam questions will also

be similar to homework problems, so you can expect that the work you put in will be reflected in your final grade.

It would be wise of you to write up your solutions to homework problems, both as practice in writing mathematics and as preparation for quizzes. Your files of homework solutions will also be a useful component of your study materials when preparing for exams. If there are homework problems that you cannot complete successfully, I urge you to come to office hours to discuss them. In some cases problem solutions will also be discussed in class.

There will be no make-up quizzes in case of absence, but your two lowest quiz grades will be dropped. If you are absent for a documented reason (e.g. you have a note from a doctor), or on account of a religious observance about which you notify me during the first two weeks of class you may also be excused from a quiz without it counting toward one of your two dropped scores.

There will be at least one in-class midterm. The reason for having one rather than two is that I believe by 1/3 of the way into the semester you have not encountered, studied, and done homework on enough material to fill an exam. Nonetheless I will consider giving two midterms if people can give a good reason for doing so.

Solutions to the Midterm are now available.

Expectations, grading, how to succeed

My expectation is that you attend class, listen, ask questions, talk with fellow students, study suggested readings, do homework and generally become involved in thinking about and understanding the material. If you are doing this, and coming to talk to me when things seem difficult, I think you should be able to earn a decent grade in the course, and I will help you to do that. With that said, some people find this material a lot more challenging than others, and, as in most mathematics courses, failing to grasp an important idea early on can make it very difficult to understand later material. Do not get behind and plan to catch up later.

I will tell you on request, or at the time of returning the midterm, if I think you are in danger of earning a D or F in the course, and will help you plan your studies in order to earn a passing grade. Please be aware that making such a plan is not a guarantee of success, but that you can come to me at any time to discuss your progress and your options.

A small note on the use of cellphones and similar in class: please do not do so except in case of emergency. Even texting distracts other students and impedes your ability to learn (if you doubt that multitasking is "doing several things poorly at once" I urge you to consult the rich scientific literature on this topic).

Academic Integrity

I assume that you are honorable people who will not cheat, plagarize or otherwise seek unfair advantage over your peers. If I discover otherwise I am obliged to report it. If you have any doubts about what is appropriate you should consult the UConn Academic Integrity FAQ.