Advanced Calculus I
MA 471G Section 001 – Fall 2019

Syllabus

Instructor: Francis Chung
Office: 727 Patterson Office Tower
Office Hours: Monday 11-12, Tuesday 2-3, Wednesday 10-11, or by appointment.
Email: fj.chung@uky.edu
Class Meetings: MWF 9-10, CB 341.

Course Content and Goals The objective of this course is to start from "scratch" (and we'll discuss what that means) and develop the theory of calculus rigorously (and we'll discuss a little bit what that means too!). We'll examine rigorous definitions of the basic concepts of calculus: convergence, limits, derivatives, integrals, etc. and use them to provide proper proofs to some of the major theorems of calculus.

Important topics include

- Axioms of the real line, including the least upper bound property;
- Sequences and series: convergence, basic convergence theorems, Bolzano-Weierstrass theorem, and Cauchy sequences;
- Limits and continuity: definitions, basic properties, Intermediate and Extreme Value Theorems;
- Derivatives: definitions, derivative theorems, including the Chain Rule, Mean Value Theorem, and L'Hôpital's rule;
- Sequences and series of functions: notions of convergence, continuous limit theorem, Taylor Series, convergence tests;
- Integrals: definition of the Riemann integral, basic properties, and the Fundamental Theorems;

This course is also intended to develop students' proof writing and mathematical communication skills; students are expected to be able to come up with their own proofs of propositions involving the ideas and concepts discussed above, and communicate them both in formal and informal settings.

Course Texts There is no required text for this class. However, in order to provide some coordination with the other section of MA 471G running this term, both sections will be roughly following the book *Understanding Analysis* (2nd ed.) by Stephen Abbott; in class I will indicate which sections in the text correspond to the material under discussion. Having access to this text is strongly recommended as a supplement to lecture and other class material – the book contains much more mathematical exposition than could ever be conveyed in a single term of lectures.

There are a number of other good books which cover similar material, including *Calculus* by Michael Spivak and *Analysis, Volume I* by Terry Tao. These could serve as useful references, although they are not necessary for this course.

Assessment and Grading:	Problem Sets	25 %
	Class Participation	10 %
	Midterms	40 %
	Exam	25 %

Letter grades will be assigned to percentages in the usual (American) manner: 90-100% is an A, 80-89% is a B, 70-79% is a C, 60-69% is a D, and below 60% is an E.

Problem sets will be assigned roughly once per week, to be turned in at the beginning of class on the due date. Late problem sets will not be accepted. Solutions should be written clearly, in complete sentences. You are allowed and in fact encouraged to discuss problem sets with others, but your solutions must be written up independently. Plagiarism, cheating, falsification and misuse of academic records are bad things. University policy on these offenses is specified in the Code of Student Rights and Responsibilities available through the ombudsperson, and in the Senate rules (Section 6.3).

Some of our regular class time will be dedicated to student-led discussions. Students should be present and engaged in these discussions; repeated absence or lack of engagement will adversely affect the class participation score. Per university senate rules, students who are absent for more than one fifth of the scheduled classes are expected to withdraw.

There will be three midterm exams in this course. The first and third midterms will be in class, and are scheduled to occur on September 25 and November 20 respectively. Each of these is worth 10% of the overall grade. The second midterm will be a take-home test worth 20% of the overall grade, assigned on October 23 and due at the beginning of class on October 25. Unlike for the problem sets, the take-home midterm is not to be discussed with others, inside or outside the course, and must represent entirely your own work and ideas.

The final exam is scheduled by the university to occur on December 17, 2017, from 8-10am.

Accommodations: If you have a documented disability that requires academic accommodations, please see me as soon as possible. In order to receive accommodations in this course, you must provide me with a Letter of Accommodation from the Disability Resource Center for coordination of campus disability services available to students with disabilities.

Updates to this document, along with announcements and problem sets, will be posted on Canvas.