

An Introduction to Harmonic Analysis, 2020-2 Information for Students

Time	MWF 13:00-14:15
Location	Sicua Plus https://us.bbcollab.com/guest/04151ef41fad467bace8709f2f33bb6f
Instructor	Susanna Dann (office H 402)
Office hours	by appointment
E-Mail	s.dann@uniandes.edu.co
Prerequisites	Analysis 1, Measure Theory

Course Description

In this course we will study a basic tool of analysis: the Fourier series. We will start with basic notions related to the Fourier series and their pointwise convergence as well as convergence in the norm. Then there are several possibilities how to proceed further. For example, we could continue with Hardy spaces and notions related to the theory of analytic functions in the unit disc; discuss lacunary series and their relations to Probability Theory; turn to the non-commutative case on the group $SO(3)$, etc.

For the most part we will follow the book by Katznelson and cover chapter I and II, and possibly III and V. For the part about the lacunary series we would use the book by Zygmund. Depending on the additional material we will cover, we might use some additional literature.

Tests

There will be two midterm exams, each worth 15%, and a final exam, worth 30%. If the whole class will be taught online, then all these tests will be take-home. In case we will be allowed to return to campus, the tests will be held in class.

Homework

You will be given a couple of problems to work on at the end of almost every class. A group of them, say ten such exercises, will form a homework assignment. We will have about eight such homework assignments. They will contribute 40% to the final grade. Most problems will be due before the next class. We will discuss the solutions in class. Naturally, after a solution to an exercise is presented in class, the late submissions cannot be considered.

You are welcome to discuss and work with others on homework problems, however you have to write your own solutions. In case you did not work out a problem by yourself you must mention the sources or help received: people who helped you or people that you worked together to solve the problem, internet sites or books. Any suspicious cases will be send to the academic honesty committee.

Grades

There will be about eight homework assignments, worth in total 40% of the final grade. Two midterm exams each contributing 15% and a final exam contributing 30%.

In addition, graduate students will be given topics related to the class material to work through and to present in class.

Moreover, every student will present solutions to homework problems.

Office Hours

While all teaching will be held online, the office hours will be by appointment. If we will be allowed on campus, there will be office hours set to be held in H-402, tentatively from 8-

9:30am MWF. There will be plenty of opportunities to discuss questions related to the course material in class. Other matters can be discussed directly after class.

Bibliography

Y. Katznelson, "An Introduction to Harmonic Analysis".

A. Zygmund, "Trigonometric Series".

Remarks

This syllabus will be updated regularly to reflect our progress in the class.

	Topics covered and homework assignments
August 10	Introduction, main problem of the course, I.1: 1.1
August 12	I.1: 1.1, 1.2, 1.3, 1.4, 1.5
August 14	I.1: 1.6, 1.7, 1.8, 1.9
August 19	Discussion of assignments 1&2; reformulation of the main problem as a convolution
August 21	Discussion of the main problem; discussion of assignment 3 (#3-#6)
August 24	"where did the convolution come from?"; remarks to assignments 1-3, discussion of assignment 3 (#7-#9)
August 26	I.5: 5.1, 5.2, 5.3
August 28	I.5: 5.3, 5.4, 5.5
August 31	I.2
September 2	I.2
September 4	I.2
September 7	I.2
September 9	I.3
September 11	I.3
September 14	I.4
September 16	I.4
September 18	
September 21	First midterm
September 23	
September 25	
September 28	
September 30	

October 2	
October 14	
October 16	
October 19	
October 21	
October 23	
October 26	
October 28	
October 30	
November 4	
November 6	
November 9	
November 11	
November 13	
November 18	Second midterm
November 20	
November 23	
November 25	
November 27	
November 30	
December 2	Final exam
December 4	Final exam discussion