

Vorlesung WS 2016/17 Harmonische Analyse

Lecturer: Karlheinz Gröchenig

Time: Monday, 11:30 - 12:15, Tuesday, 11:30 - 13:00

Place: OMP 1, SR 8.

Office hours: Wednesday, 10 - 11 p.m.

Prerequisites. Analysis, some functional analysis, Lebesgue measure, some linear algebra.

Literature. This list contains some books and manuscripts that can be used as resources.

A. Constantin, *Fourier Analysis*. Contains the basic material on Fourier analysis and the necessary tools from measure theory, functional analysis. Many exercises with hints and solutions. Superb prose!

A. Deitmar, “*A First Course in Harmonic Analysis*”, good introduction, in particular with respect to abstract harmonic analysis

A. Deitmar, S. Echterhoff, “*Principles of harmonic analysis*”, very interesting, appropriate for a second semester in harmonic analysis.

H. Dym, H. McKean, “*Fourier Series and Integrals*”. A classic with a broad view and many applications

R. Edwards, “*Fourier Series. A modern introduction*”, Detailed introduction to Fourier series

H. Feichtinger, *Harmonic Analysis based on Functional Analysis*, <http://www.univie.ac.at/nuhag-php/login/skripten/data/AngAnal15Skript.pdf> Abstract approach to Fourier analysis based on theory of function spaces and functional analysis.

L. Grafakos, “*Classical Fourier Analysis*”, motivated by “hard analysis”, more analysis than harmonic analysis

K. Gröchenig, *Foundations of Time-Frequency Analysis*, advanced material, chapter 1 provides an overview of the main facts of Fourier analysis that are needed for time-frequency analysis.

C. Heil, *Lecture notes on harmonic analysis* Lots of motivation and explanation, Chris Heil is a very good writer. Notes are available at <http://people.math.gatech.edu/heil/handouts/chap1.pdf>

H. Helson, “*Harmonic Analysis*”, terse introduction to the standard material, plus interesting selection of special topics

Y. Katznelson, “*An Introduction to Harmonic Analysis*”, remains a classic, I have based several courses on this book

T. Körner, “*Fourier Analysis*”. Very entertaining, broad panorama, can be read as “good night stories”, there is a volume with exercises.

R. Laugesen, “Lecture Notes on Harmonic Analysis”, <http://arxiv.org/pdf/0903.3845v1.pdf>. Useful lecture notes. I have borrowed material in previous courses. Available on the arXive.

C. Muscalu, W. Schlag, *Classical and multilinear harmonic analysis. Vol. I.* If you want to see how modern harmonic analysis is taught on the highest level, look at this book. Don't be discouraged.

H. Reiter, “*Classical harmonic analysis and locally compact groups*”. This is how my teachers in Vienna have studied and taught harmonic analysis.

E. Stein, R. Shakarchi, “*Fourier Analysis. An Introduction*”, Princeton Lectures in Analysis. Written for Princeton undergraduates, absolutely brilliant style, I will follow it in many parts.

A. Zygmund, “*Trigonometric Series*”. This is the “bible” of harmonic analysis, is considered one of the most perfect books in mathematics. Not suitable for a first encounter with the subject.