

## HARMONIC ANALYSIS - MATH 541, Spring 2009

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The course will provide an introduction to Euclidean harmonic analysis, with an eye toward some areas of current research. The goal is to provide a good foundation for further reading and research. The course might be of interest to students with a variety of backgrounds.

### TENTATIVE TOPICS:

- Function spaces, basic inequalities, interpolation.
- The Hardy-Littlewood maximal function, and applications to ergodic theory.
- The Fourier transform, Plancherel theorem, Hausdorff-Young inequality.
- Distribution theory, Sobolev spaces, applications to PDE.
- Restrictions of the Fourier transform, Tomas-Stein theorem.
- Fourier analysis on abelian groups, application to analytic and/or additive number theory.

**PREREQUISITES:** Completion of Math 420/507 and 421/510, or equivalent familiarity with basic real and functional analysis.

**TEXTBOOK:** There is no textbook for the course. We'll follow the lecture notes of T. Tao (<http://www.math.ucla.edu/~tao/247a.1.06f/>), additional notes may be handed out.

Suggested reading: Stein and Shakarchi, Princeton Lectures in Analysis, Book I: *Fourier Analysis and Partial Differential Equations*