Math 671–001 (Fourier Analysis)
Spring 2007

Instructor: David Walnut

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Text: Elias M. Stein and Rami Shakarchi, *Fourier Analysis: An Introduction*, Princeton Lectures in Analysis I, Princeton University Press (2003),
ISBN 0–691–11384–X.

Prerequisites:

Advanced calculus (Math 315 or equivalent).

Topics:

The course will cover some or all of the following topics.

1. Solutions to the 1-D wave equation
2. Convergence of Fourier series for periodic functions, or functions on the circle (pointwise, uniform, L^2).
3. The Fourier transform on $\mathbf{R}$ (definition and properties, inversion formula, convolution, decay vs smoothness, Parseval and Plancherel formula)
4. Fourier duality in other settings ($\mathbf{T}$, $\mathbf{Z}$, $\mathbf{R}$, Poisson summation formula, the FFT, signals and systems)
5. General Orthonormal and related systems (wavelets, frames, Riesz bases, finite frames)
6. Shannon Sampling and related topics (irregular sampling, Kadec 1/4-theorem, some complex variable techniques)
7. The Radon transform (definition, inversion)

Grading:

There will be regular homework assignments given throughout the semester. Homework counts for approximately 70% of your final grade.

The remaining 30% of your grade will be based on a take-home midterm and an in-class final exam. Precise dates and coverage for these exams will be announced.