

# COURSE ANNOUNCEMENT

## MATH 412/612

### FUNCTIONAL ANALYSIS

**Spring Semester 2009**

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Functional analysis is the branch of mathematics concerned with the study of topological vector spaces and bounded linear operators acting upon them. You may think about functional analysis as infinite dimensional linear algebra, combined with topology and analysis. It has its historical roots in the study of spaces of functions, in particular transformations of functions, such as the Fourier transform, as well as solution spaces of differential and integral equations. Several of the objects of study, like Banach spaces and Hilbert spaces are of fundamental importance in many areas, including the mathematical formulation of quantum mechanics.

**Textbook:** Introductory Functional Analysis with Applications by Erwin Kreyszig, ISBN-10: 0471504599.

Topics will include: Topology of Metric spaces, Normed spaces, Linear operators and functionals, Hilbert spaces, Self-adjoint, unitary and normal operators, Hahn-Banach theorem, Uniform boundedness theorem, Open mapping theorem, Closed graph theorem, Spectral theory and applications. Depending on the audience, additional topics may be discussed.

**Prerequisites:** Math 311 or permission of the instructor.