MATH 7320
Functional Analysis
Fall 2016

Class: Tu&Th 1pm-2:30pm, AH 301

Instructor: Bernhard Bodmann, *bgb* @math.uh.edu

Office: PGH 604; M 1-2pm, W 10:30-11:30am

Content: This course is part of a two semester sequence covering the main results in functional analysis, including Hilbert spaces, Banach spaces, topological vector spaces such as distributions, and linear operators on theses spaces.
Functional analysis combines two fundamental branches of mathematics: analysis and linear algebra. Limiting arguments from analysis become essential in order to resolve questions from linear algebra in infinite-dimensional spaces. In addition, there are close connections between algebraic and topological properties in such spaces that deepen our understanding even in the finite dimensional case.
Topics covered in this first part of the course sequence include: Topological vector spaces (linear mappings, metrizability, bounded operators and continuity, seminorms and local convexity, quotient spaces); Completeness (Baire category and the Banach-Steinhaus theorem, an application to Fourier series, open mapping theorem, closed graph theorem); Convexity (Hahn-Banach theorem, weak topology and separation theorems, compactness and duality, subspaces and quotients); Spectral theory (Banach algebras and their representation, commutativity, resolutions of the identity, spectral theorem, eigenvalues of normal operators, positivity); Distributions (linear functionals on topological vector spaces, working with distributions, localization theorems).

Prerequisites: Graduate standing. Linear algebra (Math 4377) and Real Analysis (Math 4331/4332). Knowledge of Lebesgue integration is desirable.

Text: Walter Rudin, Functional Analysis, 2nd edition, McGraw Hill, 1991.

Assignments: You will be asked take notes and typeset them in LaTeX.

Final Grade: Based on the quality of notes.