Math 255B, Functional Analysis

MWF 10-11 in MS 5233
Instructor: Dimitri Shlyakhtenko.

Winter 2003

We'll cover a number of topics in basic functional analysis, having in mind applications to other fields. These topics will include:

- Basic theory of locally convex spaces: the geometric for of Hahn-Banach theorem, weak and weak-* topologies; convexity and Krein-Milman theorem. Fixed point theorems such as the Ryll-Nardzewski fixed point theorem and its consequences: existence of Haar measure, equivalent definitions of amenability for groups.
- Fredholm operators and Fredholm index.
- Unbounded operators, Stone's theorem.
- Basic theory of C^*-algebras. Representations, states, completely positive maps.
- A basic introduction to free probability theory, if time permits.

Prerequisites: familiarity with material from 245 and 255A: basic theory of Banach spaces, Hilbert spaces, and the spectral theorem for self-adjoint operators on a Hilbert space.