

6150 FUNCTIONAL ANALYSIS SPRING 2017
TR 3:30AM-4:50PM

BÜNYAMIN SARI

This course is an introduction to Functional Analysis and common functional analytic techniques. Since the basic principles of functional analysis (Hahn-Banach, Open mappings, etc.) are covered in Real Analysis, we will only give a short review of those. Roughly, we will cover the basics of

- (1) Weak and weak* topologies, and duality
- (2) Bases and basic sequences
- (3) Structure of the classical Banach spaces $C(K)$, L_p , c_0 , ℓ_p ($1 \leq p \leq \infty$).
- (4) The algebra of bounded linear operators

No textbook is required. Lecture notes will be provided. Some of the recommended ones (there are plenty other, however)

- B. Bollobas, Linear Analysis
- N. Carothers, A short course on Banach space theory
- Fabian et al, Banach space theory

Grading will be based on attendance and a class presentation. Each participant selects a project and writes a short but concise exposition (less than 5 pages or so) and present in class. In most cases, a project consists of presenting a single theorem, or explaining a widely used notion. I will meet with you in the second week to select a project that is likely be helpful to your own thesis research. I will provide references and clear instructions on what to include in the project. Some sample project topics are

- Ramsey theorem and applications
- Ordinal indices and Bourgain's index theory
- Finite dimensional normed spaces and Auerbach theorem
- Cantor-Bendixson index and classification of $C(K)$ spaces for K countable compact
- The standard Borel space of all separable Banach spaces
- Pelczynski's universal space
- Conditional expectation and the unconditionality of Haar basis
- Compact operators
- Spectral theorem
- Invariant subspaces
- Fixed point theorems
- Tsirelson space
- James space

You are welcome to suggest your own.

E-mail address: bunyamin@unt.edu