

Math 541: Functional Analysis

Spring 2018

Lectures: MWF 11:00-11:50 pm, 347 Altgeld Hall

Instructor: Florin P. Boca (fboca@math.uiuc.edu)

This course will provide an introduction to Functional Analysis. The main topics will include:

- Review of abstract measure theory.
- Basic topics on Banach spaces, linear and bounded maps on Banach spaces, open mapping theorem, closed graph theorem.
- Hahn-Banach theorem, Banach-Alaoglu theorem, extreme points, Krein-Milman theorem. Applications.
- Compact operators, spectrum and the spectral theorem for compact operators on Hilbert spaces.

Further topics (time permitting): Functional calculus, Fredholm alternative, unbounded operators, Riesz representation theorem, Haar measure for locally compact groups, non-linear functional analysis, distributions and Sobolev spaces.

Prerequisite: Math 540.

Textbook: There is no required textbook. The instructor will use his own notes.

Recommended textbooks:

- J. B. Conway, A Course in Functional Analysis.
- W. Rudin, Functional Analysis.
- G. B. Folland, Real Analysis. Modern Techniques and their Applications.
- Y. Benyamini and J. Lindenstrauss, Geometric Nonlinear Functional Analysis.

Grading: The final grade will be based on six homework assignments (90%) and class participation (10%).