

Math 546: Hilbert Spaces

Spring 2015

MWF 10:00-10:50 am, 243 Altgeld Hall

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

Office Hours (362 Altgeld Hall): Mon 4-5 pm, Th 3-4 pm, or by appointment

This course will provide an introduction to the spectral theory of linear operators on Hilbert spaces. The main topics will include:

- Geometrical properties of Hilbert spaces.
- Basic theory of Banach algebras and C^* -algebras.
- Integration of vector-valued functions and holomorphic functional calculus.
- Spectral decomposition of bounded normal operators.
- Functional calculus with Borel functions.
- Unbounded operators on Hilbert spaces.
- Semigroups of operators.
- Compact operators. Schatten-von Neumann classes. Fredholm operators and index theory.
- Completely positive maps and dilation theory.

Prerequisites: Successful completion of Math 541, or acquaintance with Chapter 5 (Elements of functional analysis) and with Chapter 7 (Radon measures) in Folland's book on Real Analysis.

Textbook: The textbook "A Course in Operator Theory" by John B. Conway (Graduate Studies in Mathematics, Vol. 21, American Mathematical Society, 2000) is recommended and will be used as main reference. The book "A Course in Functional Analysis" (Springer, 1990), by the same author, provides good resources for some parts of the course.

Grading: The final grade will be based on a final term presentation, four homework assignments, and class participation.