

TOPICS IN OPERATOR THEORY — 106435
(SPRING 2016)

Instructor. Orr Shalit.

Schedule. Sundays 10:30-12:30 and Mondays 13:30-14:30.

Syllabus. This course will serve two purposes. First, it is meant to be an introduction to some important topics in operator algebras: basic C^* -algebra theory, completely positive and completely bounded maps, non-selfadjoint operator algebras, operator spaces, and the C^* -envelope. The second purpose of this course is to cover the connections and applications of the above to topics in operator theory and function theory, touching upon classical as well as recent results and problems.

List of topics

- (1) Isometric and unitary dilations of families of contractions.
- (2) Basics of C^* -algebras: commutative C^* -algebras, representations, the GNS representation.
- (3) Completely positive maps, Stinespring's dilation theorem, Arveson's extension theorem.
- (4) Some Hilbert function spaces: the Hardy space, the Drury-Arveson space.
- (5) Applications to function theory: generalized interpolation.
- (6) Commutative and noncommutative Choquet theory, injective envelopes, C^* -envelopes, hyperrigidity.

Prerequisites. Introduction to Functional Analysis 104276, Complex Function Theory 104122, and Functional Analysis 106942 (or their equivalent). Exceptional students may request special permission to register without 106942, after obtaining the instructor's approval.

Grade. Every student will either solve some problems or write a report on a subject related to the subjects studied. The grade will be based on the written assignment, and an oral presentation of it.

Bibliography.

- 1) J. Agler and J.E. McCarthy, *Pick interpolation and Hilbert function spaces*.
- 2) K.R. Davidson, *C^* -algebras by example*.
- 3) V.I. Paulsen, *Completely Bounded Maps and Operator Algebras*.
- 4) B.S. Nagy, C. Foias, H. Bercovici and L. Kérchy, L, *Harmonic analysis of operators on Hilbert space*.