Introduction to C^*-algebras

Koen van den Dungen

Lecture schedule

Lectures are scheduled in October and November 2017 as follows.
- Wed Oct 4, 11:15–13:00, Room 005
- Mon Oct 9, 11:15–13:00, Room 136
- Wed Oct 11, 11:15–13:00, Room 136
- Mon Oct 16, 11:15–13:00, Room 136
- Wed Oct 18, 11:15–13:00, Room 136
- Mon Oct 23, 11:15–13:00, Room 136
- Wed Oct 25, 11:15–13:00, Room 136
- Mon Oct 30, 11:15–13:00, Room 136
- Mon Nov 6, 11:15–13:00, Room 136
- Wed Nov 8, 11:15–13:00, Room 136

Course contents

The course will cover at least the following topics:
- brief recap on Banach spaces and linear operators;
- Banach algebras: spectrum, Gelfand transform, Stone-Weierstrass theorem;
- C^*-algebras: definition and basic properties;
- Gelfand-Naimark duality between commutative C^*-algebras and locally compact Hausdorff spaces;
- continuous functional calculus;
- positive elements, approximate units;
- von Neumann algebras: definition and basic properties;
- (pure) states and (irreducible) representations;
- GNS (Gelfand-Naimark-Segal) construction.

Possible further topics which may be discussed:
- multiplier algebras;
- tensor products;
- group C^*-algebras;
- crossed products.

Examination

Students are expected to attend and actively participate in the lectures. The exam will consist of a seminar presentation on an advanced topic related to the course.

Recommended literature

[1] B. Blackadar, *Operator algebras: Theory of C^*-algebras and von Neumann algebras*, Encyclopaedia of Mathematical Sciences, vol. 13, Springer, 2006.
[2] K. Davidson, *C^*-algebras by example*, Fields Institute for Research in Mathematical Sciences Toronto: Fields Institute monographs, American Mathematical Soc., 1996.
[3] G. Murphy, *C^*-algebras and Operator Theory*, Academic Press, 1990.
[4] G. Pedersen, *Analysis now*, Graduate texts in mathematics, vol. 118, Springer-Verlag, 1989.
[5] M. Takesaki, *Theory of operator algebra I*, Encyclopaedia of Mathematical Sciences, vol. 124, Springer, 2001.