Leibniz Universität Hannover
Institut für Analysis

18. August 2022

SEMINAR ANNOUNCEMENT

for the Winter Semester 2022

Topic: C^*-Algebras
Organizer: Elmar Schrohe
Prerequisites: Functional Analysis.
Overview: The history of C^*-algebras starts with two groundbreaking articles by the Russian mathematicians Gelfand and Naimark in 1941 and 1943. Meanwhile C^*-algebras have become indispensable in modern mathematics. They have found numerous and deep applications in Analysis, Index Theory, Noncommutative Geometry, Topology and Quantum Physics.
Formally, a C^*-algebra is a (complex) Banach algebra A with an involution *, in which the identity $\|a^*a\| = \|a\|^2$ holds for all $a \in A$.
A simple example is given by the algebra $C(X)$ of all continuous complex-valued functions on a compact Hausdorff space X with complex conjugation as involution. Also, every closed subalgebra A of the algebra $\mathcal{L}(H)$ of all bounded linear operators on a Hilbert space H with the adjoint as involution is a C^*-algebra.
These two examples are in fact central to the theory. Every C^*-algebra is isomorphic to a closed subalgebra of $\mathcal{L}(H)$ for a suitable Hilbert space H. Moreover, every commutative C^*-algebra is isomorphic to one of the form $C_0(X)$; these are the continuous functions on a locally compact Hausdorff space X with the following property: For every $f \in C_0(X)$ and every $\varepsilon > 0$ there exists a compact subset K_ε of X with $|f(x)| < \varepsilon$ for $x \notin K_\varepsilon$.
We will start this seminar by learning the basics of the theory and studying important examples. Depending on prior knowledge and interests of the participants, different applications can be covered in the sequel.
The seminar may serve as the foundation of a Bachelor's Thesis.

References:

1. G. Murphy. C^*-Algebras and Operator Theory. Academic Press, San Diego 1990
2. K. Davidson. C^*-Algebras by Example. AMS, Providence, RI, 1996
3. I. Raeburn. C^*-Algebras. Lecture Notes.

Website: `www.analysis.uni-hannover.de/∼schrohe`
Registration: Send me an email: `schrohe@math.uni-hannover.de`