UNIVERSITÄT DES SAARLANDES
FACHRICHTUNG MATHEMATIK
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Operator Algebras
(Functional Analysis II)

Lecture in the Summer Term 2018

In this lecture, which is formally a continuation of the lecture *Functional Analysis (Funktionalanalysis)* held in the previous semester, we will focus on the operator algebraic aspects of functional analysis.

Operator algebras are generalizations of matrix algebras to the infinite dimensional setting; they are given as subalgebras of the algebra of all bounded linear operators on some Hilbert space that are invariant under taking adjoints and closed with respect to some specific topology. Roughly speaking, operator algebras are used to study by algebraic means the analytic properties of several operators simultaneously; their theory thus combines in a fascinating way linear algebra and analysis.

The most prominent examples of such operator algebras are C^*-algebras and von Neumann algebras, which show a very rich structure and have various applications both in mathematics and physics, especially in quantum mechanics. Whereas the former have a more topological flavour (and their theory is thus often addressed as *non-commutative topology*), the latter has more measure theoretic and probabilistic sides and gives rise to *non-commutative measure theory* and *non-commutative probability theory*.

We give an introduction to both the basics and some more specialized topics of the theory of C^*-algebras (such as the GNS construction, their representation theory, and universal C^*-algebras) and von Neumann algebras (such as factors and their classification, the hyperfinite factor, and group factors).

Time and Place: Mondays and Wednesdays, 14-16, SR 10

For questions please contact Moritz Weber (room 310, `weber@math.uni-sb.de`) or Tobias Mai (room 225, `mai@math.uni-sb.de`); see also

`http://www.math.uni-sb.de/ag/speicher/lehre.html`