## C\*-algebras: Noncommutative Geometry and Topology

An introductory course on Operator Algebras will take place in the Department of Mathematics of the UAB during the academic year 2013-2014. Everyone interested is welcome to attend.

The course will be delivered mainly by Ramon Antoine, Pere Ara, Francesc Perera and Henning Petzka.

Aims and Scope: The aim of the course is to develop the basic theory of C\*-algebras, with special emphasis on the classical theorems and techniques, such as the Gelfand-Naimark theorem and the (continuous) functional calculus. It time permits, an outlook into (the ongoing) classification programme of Elliott will be given.

## **Tentative Program:**

- 1. Introduction
  - 1.1. \*-algebras, Banach algebras.
  - 1.2. Hilbert spaces.
  - 1.3. C\*-algebras. First examples.
- 2. The spectral radius.
- 3. Finite dimensional C\*-algebras.
  - 3.1. Artin-Wedderburn's Theorem.
- 4. Commutative C\*-algebras.
  - 4.1. Gelfand-Naimark's Theorem.
  - 4.2. Functional calculus.
- 5. Ideals and hereditary algebras.
- 6. Gelfand-Naimark-Segal's Theorem.
  - 6.1. States.
  - 6.2. The theorem.
  - 6.3. Consequences.
- 7. K-Theory and classification: the  $K_0$  group.
  - 7.1.  $K_0$ : definition and properties.
  - 7.2. Approximately finite dimensional algebras.
  - 7.3. Elliott's classification Theorem.

## **Bibliography:**

Here are some textbooks that cover the contents of the course:

- [1] K. R. Goodearl, Notes on Real and Complex C\*-algebras, Shiva Publishing Limited, 1982.
- [2] G. J. Murphy, C<sup>\*</sup>-algebras and Operator Theory, Academic Press, 1990.
- [3] M. Rørdam, F. Larsen, N. J. Laustsen, An Introduction to K-Theory for C<sup>\*</sup>-algebras, London Math. Society Student Texts 49, Cambridge University Press, 2000.
- [4] N. E. Wegge-Olsen, K-Theory and C\*-algebras: a friendly approach, Oxford University Press, 1993.

**Room and Schedule:** The course will take place in room C1/366 every Monday at 15, starting October 21, 2013.

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