

Subject: Advanced functional analysis

Title: K-theory for C*-algebras, and beyond

Lecturer: Serge Richard (リチャール セルジユ)

Method of Evaluation: Grades based on attendance, written reports, and discussions.

Reference: There is no specific book related to this course. References and additional material will be provided during the lectures.

Purpose of the course: This course will provide an overview of some recent tools introduced at the crossroad between functional analysis, geometry and operator algebras. It can be considered as a course on non-commutative topology, which is the first step toward non-commutative geometry. In order to provide a large panorama on the subject together with applications, some details might be omitted, but references for all proofs will be provided.

Plan of the course: Tentative program: 1) C*-algebras, 2) Projections and unitaries, 3) K_0 and its properties, 4) K_1 and its properties, 5) Index map and Bott periodicity, 6) The six-term exact sequence, 7) Cyclic cohomology, 8) Connes' pairing, 9) Applications.

Keywords: C*-algebras, K-theory, index map, cyclic cohomology.

Required Knowledge: Knowledge on standard undergraduate functional analysis.

Attendance: This course is open for any students at Nagoya University as one of the “open subjects” of general education.

Additional advice: Lecture notes will be provided for this course.

Contact: richard@math.nagoya-u.ac.jp and Rm. 237 in Sci. Bldg. A