Mathematical Institute
Polish Academy of Sciences

COURSE DESCRIPTION

Course Name	Noncommutative Geometry Seminar
Course Type	Research seminar (sd)
Supervisor	Piotr M. Hajac
ECTS credit allocation	1 – IM PAN's Ph.D. programme, 3 - recommended for MA programs
Duration	Each semester
Number of hours	30 per semester
Language	English
Prerequisites	MSc in mathematics
Course content	New research results in noncommutative geometry. Key topics are: noncommutative index theory and spectral triples, compact and locally compact topological quantum groups, Hopf-Galois theory and strong connections, Hopf-cyclic homology, Baum-Connes conjecture, deformation quantization, and universal quantum symmetries. Key words are: K-theory and K-homology of C*-algebras (KK-theory), Chern character, cyclic homology, Dirac operators, multiplicative unitaries, Hopf algebras.
Recommended reading	Papers of whoever gives a talk. For background reading, we recommend the following books: 1. Noncommutative Geometry by Alain Connes. 2. Basic Noncommutative Geometry by Masoud Khalkhali. 3. An Introduction to Noncommutative Geometry by Joseph C. Varilly. 4. Elements of Noncommutative Geometry by Joseph C. Varilly. 5. Local and Analytic Cyclic Homology by Ralf Meyer. 6. K-Theory for Operator Algebras by Bruce Blackadar. 7. Theory of C*-Algebras and Von Neumann Algebras by Bruce Blackadar. 8. An Introduction to K-Theory for C*-Algebras by M. Rørdam, Flemming Larsen, N. Laustsen. 9. K-theory and C*-algebras: A Friendly Approach by Niels Erik Wegge Olsen. 10. Analytic K-Homology by Nigel Higson, John Roe. 11. Hopf Algebras by Moss E. Sweedler. 12. Hopf Algebras by Eiichi Abe. 13. A quantum groups primer by Shahn Majid. 14. Foundations of Quantum Group Theory by Shahn Majid. 15. Corings and Comodules by Tomasz Brzezinski.
Learning outcomes	Insight into the state-of-the-art of noncommutative geometry. Ability to commence own research in the area of noncommutative geometry.
Assessment methods and criteria	Regular participation, giving a talk on own research results.
Remarks	Talks are DVD-recorded and available online.