Mat-1.152
Special Course in Functional Analysis: (Non-)Commutative Geometry

What is this good for? You may learn something about functional analytic framework of topology and measure theory. And you will get an access to more advanced literature on non-commutative geometry, a quite recent topic in mathematics and mathematical physics.

What the reader is assumed to know? The prerequisite for this course is some elementary understanding of Banach spaces. Of course, it helps if the reader already knows some topology and measure theory, but we shall explicitly introduce every major mathematical tool we need. We have carefully tried to keep the presentation as simple as possible. Well, the introducing section may contain many unfamiliar concepts, but do not worry: everything will be made precise.

References

[1] B. Aupetit: *A Primer on Spectral Theory.* Springer-Verlag 1991.

[2] A. Connes: *Noncommutative Geometry.* Academic Press 1994.

[3] R. G. Douglas: *Banach Algebra Techniques in Operator Theory.* Academic Press 1972.

[4] A. Friedmann: *Foundations of Modern Analysis.* Dover 1982.

[5] R. F. Gariepy, W. P. Ziemer: *Modern Real Analysis.* PWS Publishing Company 1995.

[6] J. M. Gracia-Bondía, J. C. Várilly, H. Figueroa: *Elements of Noncommutative Geometry.* Birkhäuser 2001.

[7] G. J. Murphy: *C*-algebras and Operator Theory.* Academic Press 1990.

[8] H. L. Royden: *Real Analysis.* The Macmillan Company 1963.

[9] W. Rudin: *Functional Analysis.* Tata McGraw-Hill 1992.

[10] W. Rudin: *Real and Complex Analysis.* McGraw-Hill 1986.

[11] L. A. Steen and J. A. Seebach, Jr.: *Counterexamples in Topology.* Dover 1995.

[12] P. Suppes: *Axiomatic Set Theory.* Dover 1972.

[13] J. Väisälä: *Topologia II.* Limes 1987.

[14] N. Weaver: *Lipschitz Algebras.* World Scientific 1999.

[15] N. E. Wegge-Olsen: *K-Theory and C*-algebras.* Oxford University Press 1993.

More information on the lecture topics:
Set theory and Axiom of Choice: [12, 10, 13].
Topology: [13, 11, 8, 5].
Measure theory: [4, 5, 8, 10].
Basic functional analysis: [10, 9].
Banach algebras and C*-algebras: [7, 1, 9, 3, 6] and practically any book on advanced functional analysis (C*=B^* in [9] :)
Lipschitz algebras: [14].

For those mastering these lecture notes:
Non-commutative geometry: [2, 6, 15].