

Noncommutative differential geometry

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This course is about applying the usual methods of differential geometry (forms, vector fields, connections) to noncommutative algebras. We will also consider Hopf algebras as symmetries and positive maps on C^* algebras. It is taken from the book 'Quantum Riemannian Geometry' (Springer Grundlehren 355) by S. Majid and myself.

Syllabus:

- Differential calculi on noncommutative algebras
- Introduction to Hopf algebras and their calculi
- Calculi on graphs and finite groups
- Covariant derivatives on modules and bimodules, curvature
- Monoidal categories
- Noncommutative vector fields, states and divergences
- CP maps and the KSGNS construction, Hilbert C^* bimodules
- The flow of states generated by vector fields
- Parallel transport