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Analytic Index Theory This project will acquaint the student with several aspects of modern index theory. The index pairing between K-theory and K-homology gives important invariants which continue to make sense for ‘noncommutative’ spaces.

Possible areas of study include: K-homology, Fredholm operators in von Neumann algebras and on C^* -modules, topological formulas for the index, cyclic cohomology, analytic and cohomological formulae for the index.

Noncommutative Topology ‘Nice’ topological spaces are completely described by their algebra of continuous functions. This project will investigate the new notion of modelling ‘nasty’ topological spaces using noncommutative algebras.

The core of this project is C^* -algebra theory, and will develop some of the advanced tools for studying these objects, such as K-theory, C^* -modules and Fredholm modules.