INDEX THEORY FOR FOLIATIONS, FOLIATED HOMOTOPY INVARIANTS

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ABSTRACT. This is an introductory course to the techniques of index theory for foliations. It will be accessible to non experts and to students.

We shall first introduce several approaches to index theory for foliations and then explain some recently obtained corollaries related to foliated homotopy invariance. Here is a tentative plan:

(1) Background: K-theory, cyclic cohomology, Geometric operators and their index, the eta invariant.
(2) Review of index theory for compact manifolds, without and with boundary. The flat bundles APS-index theorem.
(3) Galois coverings, Atiyah's theorem and the Cheeger-Gromov ℓ^2 rho invariant.
(4) Torsion free case and homotopy invariance of the signature ρ-invariant.
(5) Foliations, longitudinal Dirac operators and the Connes-Skandalis index theorem.
(6) Index bundle, Chern-Connes character and the index theorem in Haefliger cohomology.
(7) The higher Haefliger signature is a foliated homotopy invariant.
(8) On the foliated homotopy invariance of the foliated rho invariant.