Department of Mathematics

University of Houston

Analysis Seminar

FRIDAY, April 13, 2018

13:00-14:00 – Room 646 PGH

Speaker: Zhizhang Xie (Texas A&M University)

Title: Secondary invariants and their applications

Abstract: One of the most fundamental invariants of elliptic operators is the Fredholm index. Given an elliptic operator, its Fredholm index is defined to be the difference of the dimension of its kernel and the dimension of its cokernel. The notion of Fredholm index can be generalized to take group actions into account. Instead of being an integer, this generalized Fredholm index lives in the K-theory of a group C*-algebra. The Fredholm index and its generalizations are usually referred to as primary invariants. They have deep applications to geometry and topology, and play a fundamental role in the study of conjectures such as the Novikov conjecture and the Baum-Connes conjecture.

In topology and geometry, when a primary invariant of an elliptic operator vanishes, a secondary invariant naturally arises. Secondary variants reveal much more subtle geometric or topological information. For example, secondary invariants can be used to study how many topological manifolds there are that are homotopic but not homeomorphic to a given topological manifold. In this talk, I will give a brief introduction to secondary invariants, and explain some of their nice applications to geometry and topology.