Graduate Student Seminar - Fall 2019

Equivariant cohomology of $\mathbb{Z}/2$-manifolds

Sergio Chaves, September 27, 2019.

If N is a compact manifold with boundary, then it can be realized as the orbit space of a $\mathbb{Z}/2$-manifold M; more precisely, as the quotient M/τ where M is a manifold of the same dimension as N and $\tau\colon M \to M$ is an involution. The manifold M might not be unique and it depends on the principal $\mathbb{Z}/2$-bundles over N. However, the equivariant cohomology module-type of these manifolds is completely determined by the cohomology of N. Before discussing these results, the necessary background on principal bundles and equivariant cohomology will be firstly introduced; only basic notions about singular cohomology will be assumed.

A twisted sheaf proof of Albert's theorem

Félix Baril Boudreau, October 4, 2019

In 1939 A. A. Albert published in *Structures of algebras* a proof that given a central simple algebra A over a field K, A has an involution of the first kind if and only if its class in the Brauer group of K has order 1 or 2.
In this talk we will introduce, following Giraud (1971), a categorical analogue of a principal vector bundle, called *G-gerbe*, as well as the notion of *twisted vector bundle* as defined in the work of Lieblich (2004).
These modern tools give us a completely different point of view on Albert's theorem and allow us to prove this result in an interesting new way.
All the necessary background will be presented and some familiarity with the basic vocabulary of category theory will be assumed.