Chern-Weil forms and abstract homotopy

Dan Freed
(UT Austin)

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Abstract: Chern-Weil and Chern-Simons forms are basic objects in differential geometry and have numerous applications. In joint work with Mike Hopkins we prove that these are the only canonical differential forms attached to a connection. The formulation and proof use abstract homotopy theory.

There will be a pre-talk by Tom McCauley at 2:30 pm in MCS 148. Title: Curvature and characteristic classes. Abstract: The classical notion of the Gaussian curvature of a surface can be extended to the more general setting of a vector bundle over an $n$-dimensional manifold, $E$ over $M$, by defining the curvature 2-form of the bundle. The curvature 2-form is constructed from a connection on the bundle, which is a directional derivative operator acting on sections of the bundle. Using the Chern-Weil homomorphism, the curvature 2-form can be used to define characteristic classes, a ring of cohomology classes on $M$ built from the data of the bundle $E$. We will define characteristic classes and look at how the geometric construction provides information about the underlying topology of $M$.

Tea will be served at 3:30 pm in MCS 144.