Title: PMATH 965 -- Topics in Geometry and Topology -- Gauge Theory

Description: This course will be an introduction to the geometry of fibre bundles with a special emphasis on vector bundles. It will cover material that any graduate student interested in geometry will find useful (such as bundles, connections, sheaves, sheaf cohomology, characteristic classes, and Yang-Mills Theory). The course should be accessible to students who have taken PMATH 465 or an equivalent course. Topics will include: Vector bundles and principal bundles (definitions and basic constructions); connections, curvature, and gauge groups; covariant derivatives and holonomy; sheaves and sheaf cohomology; characteristic classes and Chern Weil Theory; flat connections and representations of the fundamental group; metric connections on vector bundles; some important equations of gauge theory: Yang-Mills, anti-self-dual, Hermitian-Einstein; moduli spaces of Hermitian-Einstein connections; (time permitting) stable holomorphic bundles and the Kobayashi-Hitchin correspondence.