

SYLLABUS MAT 566
DIFFERENTIAL TOPOLOGY
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We will cover a series of topics in differential topology which play an important role in geometry and modern mathematical physics. Physical perspectives on these topics will be discussed in some detail. The general outline will be as follows.

1. Vector bundles, principal bundles, connections and curvature.
(Classical abelian and non-abelian gauge field theory.)
2. Classifying spaces and characteristic classes.
(Monopoles, zeros of vector fields, non-immersion theorems)
3. Chern-Weil Theory.
4. Spin manifolds, spinors and Dirac operators.
5. Transversality and cobordism

Time permitting we will cover aspects of:

6. The Atiyah-Singer Index Theorem
(Instantons, applications in geometry)
7. Seiberg-Witten Theory