MATH 876

Differential Topology

Prof. Victor Turchin

Required text: *Introduction to Smooth Manifolds*, John M. Lee.

Recommended text: *Topology from the Differentiable Viewpoint*, J. Milnor

The course includes: Smooth manifolds; smooth maps; smooth partitions of unity; tangent spaces and tangent bundles; derivatives; inverse function theorem and applications; Morse functions; embedding theorems; orientations and orient ability via tangent bundles; cotangent and exterior bundles; differential forms; integration on manifolds; vector fields and Lie derivatives; DeRham cohomology and DeRham's theorem.

Along with standard theorems, the course will include:

1. Definition and example of Lie groups

2. Frobenius theorem (time permitting, most likely without proof)

Pre-requisites for the course are:

MATH 701 Elementary topology (or MATH 560) Definition of a topological space, compactness, separation axioms, metric spaces.

MATH 634 Advanced Calculus 2 (or MATH 222 Calc 3) Differentiation and integration of functions of many variables.

MATH 512 Linear Algebra, Definition of an abstract vector space, dual space, adjoint operator.

It will also be helpful if you are familiar with some standard groups like symmetric group (group of permutations), linear group GL (n), orthogonal group O(n).

For more details about the course, see Professor Turchin.