MATH 722: DIFFERENTIAL TOPOLOGY 2

Spring 2016 Syllabus

T-TH 11-12:30, MCS B31

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Office hour: Wednesday 1-4pm

Overview:

This course is a continuation of MATH 721: Differential topology 1. We will introduce the **Mayer-Vietoris sequence**, which is the central tool to compute **de Rham cohomology**. As an important application of de Rham theory, we will define the **Poncare dual of a submanifold**, which plays a key role in **intersection theory**. We will also study **distributions** and **foliations**. An important class of manifolds, known as **homogeneous spaces**, is provided by **Lie theory**. We will also take a visit to **symplectic geometry**, which is a relatively new branch of differential geometry motivated from classical and quantum mechanics. Finally we will introduce **Chern classes** and **Morse theory** if time is permitted.

Prerequisites:

MATH 721: Differential topology 1. This includes manifolds, vector bundles, Lie groups, differential forms, and calculus on manifolds.

Textbook:

Lee - Introduction to smooth manifolds

References:

Do Carmo - Differential Forms & Applications
Chern-Chen-Lam – Lectures on Differential Geometry
Nicolaescu – An invitation to Morse theory

Homework:

We will have homework weekly or biweekly. Late homework will not be accepted. Students may discuss homework with each other (and are encouraged to do so) but all written work must be prepared independently.

Exam:

There will be one take-home mid-term test and one take-home final exam. The mid-term test will be scheduled the week before spring break.

Grading:

Homework	20%
Take-home mid-term test	40%
Take-home final exam	40%