

ANALYSIS ON MANIFOLDS I
FALL 2014

DMITRY NOVIKOV

Lectures. Sun, 10:15-12:00, Room 261.

1. GENERAL INFORMATION

The course is part of the course “Basic topics in geometry 1”. The second part “Algebraic Topology” by Avraham Aizenbud is on Tuesday 12:15-14:00, Room 261.

The two parts will depend on each other and the students are expected to attend both parts (unless they know the material of one of them).

The course webpage is

www.wisdom.weizmann.ac.il/~dnovikov/Manifolds5775/index.html

2. CONTACT

Dmitry Novikov
dmitry.novikov@weizmann.ac.il
Room 143, Ziskind
tel.:+972(8)9343110

3. OVERVIEW

The main subject of the course are smooth manifolds and differential topology. We mainly follow the book *Differential topology* by Guillemin and Pollack. Additional textbooks are *Introduction to Smooth Manifolds* by John M. Lee.

Prerequisites are some basic general topology and multivariate calculus.

4. PLAN OF THE COURSE

4.1. Manifolds and smooth mappings. Definition of manifolds, submanifolds, tangent vectors, immersions, differentials of maps, submersions, transversality, embedding into \mathbb{R}^n , tubular neighborhood theorem, Whitney approximation theorems, Brower and Jordan theorems.

4.2. Intersection theory. Manifolds with boundary, intersection theory mod 2, Jordan-Brower and Borsuk-Ulam theorems, orientation, oriented intersection theory, Lefschetz index, vector fields, Euler characteristics

4.3. Differential forms. Exterior algebra, differential forms, Lie derivatives, Frobenius theorem, Integration, Stokes theorem, exterior differential, densities, Poincare lemma, de Rham theorem.