

# ALGEBRAIC TOPOLOGY

by Alex Degtyarev

## Tentative course contents

- Homology and cohomology: definitions and basic properties (homotopy invariance, exact sequences, excision).
- Homology of  $CW$ -complexes; uniqueness of homology theory.
- Cohomology and homology multiplication.
- Homology of manifolds (Poincaré duality, Thom isomorphism, intersection pairings, representation of homology classes by submanifolds).
- Introduction to obstruction theory; interpretation  $H^n(X) = [X, K_n]$ .
- Cohomology operations (general theory, Steenrod squares).
- Vector bundles and  $G$ -bundles; characteristic classes.
- Extraordinary (co-)homology theories (if time permits).

Examples, generalizations, applications, and calculations will be considered whenever applicable. Familiarity with homotopy theory is assumed (mainly, the concept of homotopy and homotopy equivalence; obstruction theory requires basic facts on homotopy groups). The contents is subject to change without notice.