

Abstract and Literature

Algebraic Topology I

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The lecture course **Algebraic Topology I** is **not** an introduction into homology and cohomology theory, but a master course on classical homotopy theory. The basic notions of homotopy, the fundamental group and covering spaces are assumed to be well understood. Further requirements are singular homology and cohomology theory, so the content of the lecture courses *Topologie I + II*.

The aim is to introduce the basic notions of cofibrations and of fibrations and the concepts of cofiber sequence and fiber sequence. In particular, we will study fibre bundles and classifying spaces. The (higher) homotopy groups are introduced and their main properties are developed. The central theorems are the Freudenthal Suspension Theorem, the Hurewicz Theorem, the Whitehead Theorems (on CW homotopy types and on weak homotopy equivalences) and the Blakers-Massey Theorem. We will study loop spaces, classifying spaces and Eilenberg-MacLane spaces and their roles in homotopy theory and homology and cohomology theory.

Literature for Algebraic Topology

- G. Bredon: *Topology and Geometry*
This is a broad introduction into algebraic topology, starting even with point set topology, to homology and cohomology and then in chap. VII to homotopy theory.
- T. tom Dieck: *Algebraic Topology*
A broad introduction, covering all topics of this lecture course.
- A. Fomenko, D. Fuchs: *Homotopical Topology*
This is a tour de force through algebraic topology, touching many topics, with many surprising view points. Proofs are often not so easy to understand. (Ignore the drawings, which are not my taste.)

- A. Hatcher: *Algebraic Topology*
This book is like Bredon's book a broad introduction into algebraic topology, from the fundamental group to homology and cohomology groups and to homotopy theory (chap. 4).
- J. P. May: *A Concise Course in Algebraic Topology*
The book starts with an introduction to elementary homotopy theory and the fundamental group including covering spaces. Homology is introduced a bit short. Then come the more advanced topics of homotopy theory, for which homology and cohomology are necessary.
- E. Spanier: *Algebraic Topology*.
The classical introduction to the field.