Topology for Physicists (T) - Topology

Course	**Topology for Physicists (T)**
Course No.	Topology

Category	Type	Language	Teaching hours	CP	Semester
Elective	Lecture with exercises	English	3+1	6	ST

Requirements for Participation:

Preparation: Bachelor of physics or mathematics; the basics of exterior calculus are assumed

Form of Testing and Examination: Written or oral examination

Length of Course: 1 semester

Aims of the Course: This course gives an introduction to various topological concepts and results that play an important role in modern theoretical physics.

Contents of the Course:

Elements of homotopy theory: homeomorphic spaces, homotopic maps, fundamental group, covering spaces, homotopy groups, long exact homotopy sequence of a fibration

Homology and cohomology: Poincare lemma, Mayer-Vietoris sequence, Cech-deRham complex, Hurewicz isomorphism theorem, spectral sequences

Vector bundles and characteristic classes: Euler form, Thom isomorphism, Chern classes

Applications: Berry phase; Dirac monopole problem; visualization of closed differential forms by Poincare duality; cohomology of electrical conductance; supersymmetry and Morse theory; index theorems; homotopy classification of topological insulators

Recommended Literature:

R. Bott and L.W. Tu: Differential forms in algebraic topology (Springer, 1982)

A.S. Schwarz, Topology for physicists (Springer, 1994)

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