**Vorlesung
MA 3540 BSc
MA 4540 MSc**

Montag 15–17 Uhr
Seminarraum 0.101
Math II Lonza

Donnerstag 10–12 Uhr
Seminarraum 0.101
Math II Lonza

Niveau

3. Jahr Bachelor
oder Master

Vorlesung zählt für

Algebra/Geometrie/
Topologie

Vorlesung Herbstsemester 2015

Vektorbündel und K-Theorie

Prof. Dr. A. Dessai

Inhalt

The course gives an introduction to the theory of vector bundles and topological K-theory. Roughly speaking a vector bundle over a topological space X is a family of vector spaces parametrized in a continuous fashion by the points of X. Topological K-theory is a generalized cohomology theory which was invented by Atiyah and Hirzebruch in the late 1950s to study topological spaces by means of linear algebra. The K-theory of a topological space X is a ring $K(X)$ which measures how many different vector bundles the space X can carry. It turns out that $K(X)$ depends only on the homotopy type of X and provides important algebraic invariants of X.

The fundamental property of K-theory is its periodicity which was first proved by Bott using Morse theory. Following Atiyah's book we will discuss an elementary proof of the periodicity theorem.

Topological K-theory turned out to be an extremely important tool in mathematics. It allows a few-line proof of Adams theorem on the dimension of division algebras. It is also a key ingredient in the formulation of the Atiyah-Singer index theorem for elliptic differential operators.

The course is geared towards students with a solid background in linear algebra and analysis. Prerequisites: Linear Algebra I + II, Analysis I-III, basic notions of point set topology (as discussed in the course Algebra+Geometry II).

Literatur

- *M.F. Atiyah,"K-Theorie", Benjamin Press (1967), ABP (1994)*
- *A. Hatcher, Vector bundles and K-Theory, http://www.math.cornell.edu/ hatcher/VBKT/VBpage.html (2009)*
- *D. Husemoller, Fibre bundles, Springer (1966)*

math.unifr.ch

**UNI
FR**

UNIVERSITÉ DE FRIBOURG
UNIVERSITÄT FREIBURG