Algebraic K-theory
Spring 2020

Syllabus

1. Introduction: motivations and relations with other fields
2. K_0 and classification of modules
   (a) Definition and elementary properties of K_0
      i. Group completion
      ii. Elementary module theory
      iii. Grothendieck groups
      iv. Dévissage
      v. The Resolution Theorem
      vi. Stability
      vii. Multiplicative structure
   (b) Functoriality of K_0
      i. Exact functors
      ii. Naturality of $K_0(R)$
      iii. Localization
3. K_1 and classification of invertible matrices
   (a) Elementary matrices and commutators
   (b) Definition and elementary properties of K_1
   (c) Generalized determinants
   (d) K_1 as a Grothendieck group

Bibliography

1. Bruce A. Magurn, *An Algebraic Introduction to K-theory*, Encyclopedia of Mathematics and its Applications **87**, Cambridge University Press, 2009.

   (The course will be based primarily on Chapters 3, 4, 5, 6, and 9 of this text.)

2. Joseph J. Rotman, *An Introduction to Homological Algebra*, Academic Press, 1979.

   (Chapters 2, 3, and 4 of this reference book should also prove very useful.)

The exam

The exam for this course will be a written test, which will count for 70% of your grade.

Each week you will receive a set of exercises, of which one must be handed in the following week to be graded by the teaching assistant. Your average grade on the exercises will count for 30% of your final grade.

The course wiki

All exercise sets, submitted solutions and other course information can be found here.

`https://www.epfl.ch/labs/hessbellwald-lab/teaching/2019-2020/`