Algebraic K-theory
Spring 2011

Syllabus

1. Introduction: motivations and relations with other fields [Week 1]
2. K_0 and classification of modules
   (a) Definition and elementary properties of K_0 [Weeks 1 to 5]
      i. Group completion
      ii. Grothendieck groups
      iii. Devissage
      iv. The Resolution Theorem
      v. Stability
      vi. Multiplicative structure
   (b) Functoriality of K_0 [Weeks 6 to 8]
      i. Exact functors
      ii. Naturality of $K_0(R)$
      iii. Localization
3. K_1 and classification of invertible matrices [Weeks 9 to 11]
   (a) Elementary matrices and commutators
   (b) Definition and elementary properties of K_1
   (c) Generalized determinants
   (d) K_1 as a Grothendieck group
4. K_2 and relations among matrices
   (a) Definition and elementary properties of K_2 [Week 12]
   (b) Exact sequences [Weeks 13]
      i. The relative sequence
      ii. Excision and the Mayer-Vietoris sequence
      iii. The localization sequence
   (c) Matsumoto's Theorem [Week 14]

Bibliography

This course will be based primarily on Chapters 3, 4, 5, 6, 9, 12, 13, and 14 of the following text.

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