Plan

Saturday, 3 October 2020 20:37

① Introduction

② Category theory:
Basic definitions, initial/final object, mono/epi, functors, natural transformations, adjoint functors, limits/colimits, adjoint functors and limits/colimits

week 1

③ Abelian categories: definitions, exactness, adjoint functors and exactness, tensor products, tensor/hom adjunction, Freyd-Mitchell embedding theorem.

weeks 1/2

④ Chain complexes: definition, quasi-isomorphisms, double complexes, total complex of a double complex, truncations, shifts, long exact sequence from a s.e.s of complexes, homotopies, mapping cone

weeks 2/3

⑤ Derived functors: δ-functors, universal δ-functors, projectives, projective resolutions, comparison theorem, horse shoe lemma, injectives, injective resolutions, adjoints preserving injectives/projectives, derived functors, derived functors are universal δ-functors,

weeks 4/5

⑥ Extra topics:
balancing Tor and Ext, Ext and extensions, Künneth formula, Universal coefficient theorem, Koszul complexes

Weeks 6/7

⑦ Group Cohomology: definitions, cyclic and free groups, extensions and H^2, crossed product algebras and the Brauer group.

week 8

⑧ Remarks on the derived category.
(non-examinable) week 8