

Fall 2010
Math Algebra III

Standard Topics:

Multilinear Algebra

Tensor products, Basic properties; Functorial isomorphisms; Tensor product of algebras; Tensor algebra, Symmetric algebra; Exterior (wedge) product, exterior algebra.

General field extensions

Transcendence basis, transcendence degree; Noether normalization; Inseparable extensions; Derivations

Fields with Valuation

Dependent and independent absolute values; Valuations; Completions; Finite extensions; Hensel's Lemma

One of the following Topics:

Representation of Finite Groups

Representations and semisimplicity; Characters; 1-dimensional representations; Class functions; Orthogonality relations

Some Commutative Algebra

Localization, Hom and Tensor, Primes in a localization; Noetherian rings and modules; Associated primes; Primary decomposition

Elements of Homological Algebra

Complexes; Homology sequence; Euler characteristic, Grothendieck group; Injective modules, Homotopies of morphisms of complexes; Derived functors