

Core Curriculum for Graduate Study

Advanced Algebra II (221U4460)

Instructor: Jungkai A. Chen

Office: Old Math. Bldg 108

Office Hour: by appointment.

TEL: 23633860-131

Email: jkchen@math.ntu.edu.tw

Fri. @ (12:20-13:10), Sat. 1,2 (8:10-10:00)

TA: Huang, Shiu-Lien

TA session: Fri. 4 (11:20-12:10)

First meeting: Feb 20, 2004 (Fri.)

Course outline:

1. Field Theory
 - Separable and inseparable extensions.
 - Transcendental extension and transcendental degree.
2. Ring theory
 - Modules (homomorphism, tensor product).
 - Chain conditions.
 - Jacobson radical.
 - Density theorem.
 - Semisimplicity.
3. Commutative algebra (including some algebraic number theory and some algebraic geometry)
 - Noetherian rings.
 - Primary decomposition.
 - Integral extension.
 - Going-up and going down theorem.
 - Discrete valuation ring.
 - Dedekind domain.
 - Algebraic sets.
 - Noether normalization theorem and Hilbert's Nullstellensatz.
 - Dimension theory.
4. Homological algebra

Complexes.

Resolution

Hom, tensor product, Ext and Tor.

Derived category and derived functors.

Reference:

1. Hungerford, *Algebra, GTM 73*
2. Lang, *Algebra, GTM 211*
3. Herstein, *Noncommutative rings*
4. Atiyah, MacDonald, *Introduction to commutative algebra*
5. Eisenbud, *Commutative algebra with a view toward algebraic geometry, GTM 150*

Grading:

- | | |
|----------------------|-----|
| 1. Homework | 25% |
| 2. Midterm | 35% |
| 3. Final Examination | 40% |