

Mathematics 423/502. Algebra II

TTh 11:00-12:30, January - April 2023, in MATH Building, room 225.

Instructor: Zinovy Reichstein

Textbook: Atiyah and Macdonald, Introduction to commutative algebra.
Available on line through UBC library.

Course description: This is a course in commutative algebra, with some homological algebra mixed in. This material is of interest in its own right; it is also important for advanced work in algebraic geometry, algebraic topology and algebraic number theory. The main topics will be:

- Rings, ideals, nilradicals.
- Local rings and localization.
- Modules: tensor product, exact sequences, extension and restriction of scalars.
- Noetherian and Artinian rings.
- Hilbert basis theorem.
- Hilbert's Nullstellensatz, Noether normalization theorem, and an introduction to affine algebraic geometry.
- Gröbner bases.
- Time permitting, we may explore further topics in valuation theory or invariant theory.

The textbook by Atiyah and Macdonald is a classic. Each chapter conveys a vast amount of information in just a few pages. Most of the time the lectures will follow and supplement the book. The main exception will be the material on Gröbner basis, where I will rely on other sources.

Homework: I plan to assign 4-5 problem sets throughout the term. Interaction and collaboration on homework is encouraged, but the work you turn in should be your own, written in your own words.

Evaluation: Course marks will be based on the homework (25%), a midterm exam (25%) and a final exam (50%). The midterm will be given in class Tuesday, February 28.

Further information will be provided on Canvas.