

Math 380A Syllabus (Fall 2017)

Instructor: Zhiwei Yun

Time: MW 1-2:15pm, starting from Aug 30.

Classroom: LOM 205

Office Hours: TTh 3-4pm, at DL 425

Webpage: <http://gauss.math.yale.edu/~zy98/teaching.html>

Textbooks: Lang, *Algebra*

Atiyah-Macdonald, *Introduction to Commutative Algebra*

Topics:

- Basics of rings and modules: polynomial rings, group rings, ideals, tensor product, UFD, PID, structure of modules over PIDs.
- Category theory: categories, functors, adjoints, limits.
- Localization and completion: localizations of rings and modules, Nakayama's lemma, p-adic numbers.
- Spectrum of a ring.
- Noetherian and Artinian rings.
- Tensor algebra: quadratic and symplectic forms, symmetric and exterior powers, duality.
- Homological algebra: projective/injective objects, derived functors, Ext, Tor, flat modules.

Homework: due every Wednesday in class, starting from Sep. 6. Each homework assignment consists of two parts: Theorems and Exercises. For the "Theorems" part, you are supposed to write detailed proofs of the stated theorems, usually the main results discussed in the class; the "Exercises" part is more like qualifying exam problems. They will be posted on the webpage.

Exam: Final take-home exam.