

Math 111 Syllabus (cross-listed with Math 81)  
based on Lang, *Algebra*

1. [3 days: II.2, II.4 - II.5] Commutative rings, prime and maximal ideals, CRT, evaluation and reduction homomorphisms, Localization of rings (field of fractions), irreducibles, primes, UFDs, PIDs, Euclidean domains.
2. [3 days: IV.1 - IV.3] Polynomials in one variable, over UFDs, Gauss's lemma, irreducibility criteria.
3. [3 days: V.1] Finite and Algebraic Field Extensions.
4. [3 days: V.2 - V.3] Splitting fields, normal extensions, and algebraic closures; uniqueness.
5. [4 days: V.4 - V.5] Separable extensions, primitive element theorem, Finite fields.
6. [1 day: V.6] Inseparability (intro only)
7. [4 days: VI.1] Galois Extensions: Fundamental theorem, composite extensions
8. [3 days: VI.2] Galois groups of polynomials.
9. [3 days: VI.3] Cyclotomic extensions and polynomials

Optional topics: group rings, polynomial rings in several variables, compass and straight-edge constructions, solvability by radicals, infinite Galois groups