

January 25, 2016

18.721 SUBJECT OUTLINE

This is a tentative schedule that will be modified during the semester.

I. Plane Curves

Wed, February 3: *the Zariski topology*

Fri, February 5: *tangent lines*

Mon, February 8 *resultants and discriminants*

Wed, February 10: *genus*

Fri, February 12: *nodes and cusps*

(Mon, February 15: **President's Day**, *holiday*)

Tues, February 16: *the dual curve*

II. Affine Algebraic Geometry

Wed, February 17: *using the Hilbert Basis Theorem*

Fri, February 19: *the Nullstellensatz*

Mon, February 22: *regular functions and morphisms*

Wed, February 24: *finite group actions*

III. Projective Algebraic Geometry

Fri, February 26: *lines in three-space*

Mon, February 29: *the structure sheaf*

Wed, March 2: *morphisms*

Fri, March 4: *product varieties*

IV. Integrality

Mon, March 7: *the Nakayama lemma*

Wed, March 9: *integral closure*

Fri, March 11: *geometry of integral extensions*

Mon, March 14: *Chevalley's finiteness theorem*

Wed, March 16: **First Quiz**

Fri, March 18: *double planes*

(Mon, March 21 - Fri, March 25: **Spring Vacation.**)

V. Structure of Varieties in the Zariski Topology

Mon, March 28: *dimension*

Wed, March 30: *discrete valuation rings*

Fri, April 1: *constructible sets*

Mon, April 4: *projective space is proper*

VI. Modules over the Structure Sheaf

Wed, April 6: *\mathcal{O} -modules*

Fri, April 8: *direct images*

Mon, April 11: *closed subvarieties*

Wed, April 13: *twisting*

VII. Cohomology

Fri, April 15: *characteristic properties*

(Mon, April 18: **Patriot's Day**, *holiday*)

Wed, April 20: *construction of cohomology*

Fri, April 22: *finiteness of cohomology*

Mon, April 25: *Bézout's theorem*

Wed, April 27: *the Birkhoff-Grothendieck theorem*

VIII. Algebraic Curves

Fri, April 29: *divisors on curves*

Mon, May 2: *differentials*

Wed, May 4: *Riemann-Roch*

Fri, May 6: **Second Quiz**

Mon, May 9: *genus, revisited*

Wed, May 11: *curves of low genus*