

DEPARTMENT OF MATHEMATICS

ORAL EXAMINATION

Minor area: ALGEBRAIC GEOMETRY

Text: Hartshorne: Algebraic Geometry
Eisenbud & Harris, Schemes

Topics:

Hartshorne Chapter 1: (omit Section 7)

Affine varieties, Projective varieties, Morphisms, Rational maps,
Blow Ups, Non-singular varieties, Nonsingular curves, Abstract curves.

Hartshorne Chapter 2,3 & Eisenbud and Harris pp.1-30:

Spec of a Ring, Definitions and basic properties of sheaves and schemes, the structure sheaf, morphisms of schemes

<the rest of the material from chapter 2 with emphasis on special case of curves>

Cartier and Weil Divisors, principal divisors, Invertible sheaves, the Picard Group,
Quasicoherent Sheaves, the construction of $\mathcal{O}_{\mathbb{P}^n}(d)$

Linear systems,

Morphisms into projective space,

Basics of derived functor Cohomology, Cech Cohomology, The cohomology of \mathbb{P}^n ,

Serre Duality

Differentials (on smooth variables)

Hartshorne Chapter 4: (Sections 1,2,4)

Riemann-Roch Theorem, Hurwitz Theorem, Elliptic Curves.