DEPARTMENT OF MATHEMATICS

ORAL EXAMINATION

Major area: ALGEBRAIC GEOMETRY

Text: Hartshorne, Algebraic Geometry

Chapter 1: Affine varieties
Projective varieties
Morphisms
Rational maps
Nonsingular varieties
Nonsingular curves

Chapter 2 & Chapter 3 lightly with emphasis on material needed for Ch. 4:

Chapter 2: Definition sheaves & schemes
(§3,5,6,7) First properties of schemes
Sheaves of modules
Divisors
Projective morphisms (lightly)
Differentials (lightly for Hurwitz theorem Ch. 4)

Chapter 3: Cohomology of projective space
(§5,7) Serre duality theorem (7.1), (7.7), (7.12), esp. for curves
(and whatever is necessary from 3-4 to do these)

Chapter 4: Riemann-Roch
(§1-4) Hurwitz
Embeddings in $\mathbf{P}^N$ (lightly, omit strange)
Elliptic curves (omit Hasse invariant)