

DEPARTMENT OF MATHEMATICS

ORAL EXAMINATION

Major area: ARITHMETIC GEOMETRY (advanced syllabus)

Basic material:

Hartshorne Chapters I, II (up to and including §8), Chapter III (up to and including §8). Easy on foundations in Chapter III, but a solid knowledge will be expected of the cohomology of P^n and projective varieties and the Serre Duality Theorem.

Curves over algebraically closed fields. Riemann Roch, Riemann-Hurwitz, embeddings and linear systems.

Curves over Dedekind rings:

- a) Blow-ups, exceptional curves, Castelnuovo criterion
- b) Regular, minimal and relatively minimal models
- c) Arithmetic of elliptic curves, global and local heights, Mordell-Weil Theorem, Tate's algorithm, Tate-Shafarevitch group.

References: Hartshorne, Algebraic Geometry
Silverman, Elliptic curves
Cornell-Silverman, Arithmetic Geometry

To read: Hartshorne; Chapters I,II,III

Silverman; definition of elliptic curves, group law, heights, Mordell-Weil, Tate-Shafarevitch group.

Cornell-Silverman; Chinburg's article on minimal models. Understand blow-ups, exceptional curves, Castelnuovo, relatively minimal + minimal models.