

MAT4230 presentation topics

1 Classification of hyperelliptic curves

Hartshorne IV. 5 (until Clifford's theorem).

Elliptic curves: Plane cubics, j -invariant, group structure.

2 Curves in \mathbb{P}^3 and the Castelnuovo bound

Hartshorne IV. 6

3 Automorphisms of curves of $g \geq 2$.

Proof of finiteness via Hodge theory.

Hurwitz bound.

4 Construction of the Grassmannian

Glueing construction. Plucker embedding. Grassmannian functor. Universal bundles.

5 The Hodge decomposition

Main ideas of the proof of the Hodge decomposition theorem for Kahler manifolds. (No proofs or computations).

Consequences of this decomposition: Betti numbers, automorphism group.

6 Lefschetz (1,1)-theorem

Proof via the exponential sequence as in Griffiths-Harris.

Why the Hodge conjecture holds for cycles of dimension and codimension 1.

7 The Hodge index theorem

Proof as in Hartshorne V.1

8 Computations of Hodge numbers

Compute the Hodge diamond of

- Surfaces in \mathbb{P}^3
- Complex tori
- $C \times C'$ for curves C, C'
- $Bl_p(S)$