TOPICS IN ALGEBRAIC GEOMETRY - WINTER 2009

DEDICATED TO GROTHENDIECK

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Below is the list of topics covered in the course where [.] shows the number of lectures. I assumed familiarity with basics of schemes, categories, homological algebra, and spectral sequences.

- étale morphisms [2]
- étale covers and the fundamental group, Grothendieck topologies - sites [2]
- étale local ring [1]
- étale sheaves, direct and inverse images [3]
- cohomology: étale, ext, local, higher direct images [1]
- Čech cohomology, torsors and H^1 [2]
- cohomology of $\mathcal{O}^*$ [1]
- cohomology of curves [2]
- base change theorems [1]
- comparison theorem [1]
- l-adic cohomology [1]
- cohomology with compact support [1]
- Gysin and cycle maps [1]
- Poincare duality [1]
- Lefschetz fixed point formula [1]
- The Weil conjectures - proof of the rationality and functional equation [2].

References

[1] V. I. Danilov; *Cohomology of algebraic varieties.*
[2] [SGA $4\frac{1}{2}$] P. Deligne, et al.; *Cohomologie étale.*
[3] [SGA] A. Grothendieck, et al.; *Séminaire de géométrie algébrique I-VII.*
[4] R. Hartshorne; *Algebraic geometry.*
[5] J. S. Milne; *Etale Cohomology.* The book.
[6] J. S. Milne; *Lectures on Etale Cohomology.* Lecture notes.

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