FSF3606 Algebraic Geometry III 7.5 credits

Algebraisk geometri III

This is a translation of the Swedish, legally binding, course syllabus.

If the course is discontinued, students may request to be examined during the following two academic years

Establishment

Course syllabus for FSF3606 valid from Autumn 2012

Grading scale

Education cycle

Third cycle

Specific prerequisites

A Master degree including at least 30 university credits (hp) in in Mathematics.

Knowledge of basic algebraic geometry (schemes, sheaves, etc.) on the level of Algebraic Geometry II (FSF3605). This implies that a solid basic knowledge of topology and commutative algebra is needed, for instance SF2735 Homological Algebra and Algebraic Topology and SF2737 Commutative Algebra and Algebraic Geometry. To have taken a second course in commutative algebra is also desirable.

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

After the course, the student should have sufficient knowledge of the basic principles in algebraic geometry to be able to study more advanced topics as well as some research articles in algebraic geometry.

Course contents

- Čech cohomology of schemes
- Cohomology of line bundles on projective space
- Finiteness of cohomology (projective and proper schemes)
- Serre vanishing
- Serre's cohomological criterion for ampleness
- Riemann–Roch theorem (for non-singular curves)
- Serre duality (for smooth varieties)
- Hilbert polynomials of coherent sheaves
- Higher direct images
- Some results on rational and elliptic curves
- Riemann–Hurwitz formula
- Derived functors (Tor, Ext and sheaf cohomology)
- Cohomology and base change

Disposition

The course is given as a series of lectures (approx 15 x 2h). Some of the lectures are given by the participants.

Course literature

R. Vakil, Foundations of Algebraic Geometry (Math 216) och R. Hartshorne, Algebraic Geometry.

Examination

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

Each participant should give two one-hour lectures. They should also discuss the material with a teacher before giving the lecture. In addition, there are homework problems to be handed in.

Other requirements for final grade

Approved homework assignments, and lectures.

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.