

Graduate Seminar on Topics in Computational Algebraic Geometry

Prof. Dr. Nitin Saxena

Wintersemester 2011/12: From Friday, 14th October 2011.

Monday 1400-1600, LWK 1.007, Endenicher Allee 60.

Friday 1400-1600, LWK 1.007.

Background:

Students who are aware of the basics of computation and basic algebra will find the seminar especially interesting.

Outline:

This seminar will study some basic and advanced topics in computational algebra and geometry. The focus will be on understanding the key ideas behind algorithms without getting too much into the implementation details.

The students are encouraged to present at least two lectures during the semester. Some topics to choose from are given below (see Reference). To send your choices or to ask for more details contact ns@hcm.uni-bonn.de

- Gröbner bases.
- Polynomial system solving: via linear algebra.
- Polynomial system solving: via primary ideals.
- Resultants, primary decomposition and galois group.
- Factoring polynomials over finite fields.
- Factoring univariates over number fields.
- Absolute factorization.
- Real polynomial system solving.
- Gröbner bases in coding theory.
- Gröbner bases in integer programming.

Reference -

- 1) *Some Tapas of Computer Algebra* by Cohen, Cuypers and Sterk. Springer; 1 edition (December 22, 1998).
- 2) *Solving Polynomial Equations: Foundations, Algorithms and Applications* by Dickenstein and Emiris. Springer; 1 edition (June 23, 2005).
- 3) *Algorithmic Algebra* by Mishra. Springer; 1 edition (September 29, 1993).
<http://cs.nyu.edu/mishra//NOTES/AlgorithmicAlgebraMishra.pdf>
- 4) “Algebra and Computation”, Madhu Sudan. Lecture notes at
<http://people.csail.mit.edu/madhu/teaching.html>