

MATH 532

Selected Topics in Algebraic Geometry

(2018 Spring Semester)

by
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Prerequisites: Consent of the instructor

Credits: (3-0)3 / 7 ECTS

Outline(tentative): The main aim in this class is to talk about Galois theory. This is one of the main subjects where different topics come together. The first part of the course will be mostly algebraic and deal with the classical theory. The topics covered in the final part of the lecture will be a little more advanced.

As we progress, I will mention some topics for individual projects. Each student is expected to choose one and present it.

I will assume some familiarity with undergraduate linear algebra and some algebraic concepts: rings, ideals, homomorphisms, UFDs, PIDs etc., though I will assign exercises for you to get a working knowledge on these.

- 3 weeks Basic definitions and results (review of polynomial rings, factorisation, characteristic, irreducibility, Gauss lemma, Eisenstein criterion, etc)
- 3 weeks Basic Theory of Field Extensions (Algebraic and transcendental elements, minimal polynomials, finite extensions, separable, normal extensions)
- 2 weeks The fundamental theorem of Galois theory (multiple roots, splitting fields, Galois extensions)
- 2 weeks Computing Galois groups and Galois groups over various fields
- 2 weeks Characters and Cyclotomic Extensions
- 1 week Infinite Galois Extensions
- 1 week Transcendental extensions

The last 4 weeks is a potpourri of different subjects. It may change according to our pace and/or taste. For instance, we may discuss the Grothendiecks version of the fundamental theorem of Galois theory.

Bibliography: I do not recommend to use google... Here are some classical texts:

- Bewersdorff, J., *Galois theory for beginners. A historical perspective*
- Cox, D A., *Galois theory*
- Fraleigh, J B., *A first course in abstract algebra* (mostly for algebraic background)
- Stewart, I., *Galois Theory*
- Lang, S., *Algebra*. (Revised third edition is recommended)
- Dummit, Foote, *Abstract Algebra* (mostly for algebraic background)

Program: Monday , 10h00 - 12h00 Seminar II and Wednesday 15h00 Seminar II

Evaluation:

- Presentation and MT: %60
- Final: % 40