Introduction to Algebraic Geometry / Fall 2014 / Alex Küronya

Class time: Mon & Wed 10:15 – 12:00
Email: kalex@math.bme.hu
Office hours: Wed 11:15 – 12:00 in the classroom (or in the faculty room depending on the students' needs).

Text: The official text for the course is the book *'Ideals, varieties, and algorithms'* of Cox, Little, and O'Shea, luckily there are plenty of other sources for the material we will cover, some of which can be downloaded freely from the internet.

Recommended literature:

- Andreas Gathmann's lecture notes downloadable from http://www.mathematik.uni-kl.de/∼gathmann/class/alggeom-2002/main.pdf
- James Milne's notes at http://www.jmilne.org/math/CourseNotes/ag.html
- Brendan Hassett: Introduction to Algebraic Geometry, Cambridge University Press, 2007.
- Klaus Hulek: Elementary Algebraic Geometry, AMS, 2003.
- William Fulton: Algebraic Curves, an Introduction to Algebraic Geometry, available from the author's homepage:
  http://www.math.lsa.umich.edu/∼wfulton/CurveBook.pdf

All of the above books cover more material that we will end up doing, and since each one has its own focus, they complement each other very nicely.

Course Web Page: http://www.math.bme.hu/∼kalex/Fall14-iag.html

Prerequisites: The main prerequisite is the ability to manipulate polynomials with coefficients in fields (no harm is done if we assume that we work over the real or complex numbers for now), hopefully some familiarity with ring-theoretic concepts such as ideals or homomorphisms. In addition one should be aware of the abstract definition of topology and open/closed sets, but only minimal knowledge about them is required, and this can be acquired during the semester as well (you can look up the necessary material in the topology notes on my homepage).

Course description: This is a gentle introduction to algebraic geometry with minimal prerequisites, our purpose here is to get acquainted with basic concepts of the subject. For the most part, the course will be devoted to affine algebraic geometry: we will look at affine varieties, regular function defined on them, and the relationship sometimes quoted as the 'algebra-geometry dictionary'. In the last third of the course we will study the geometry of projective varieties. Some part of the time will be given over to discussing applications of algebraic geometry and connections with other fields.

The course is quite cumulative, so it is expected that you at least follow what is going on.

Grading and Exam schedule: There will be one in-class midterm and a cumulative final. In addition, there will be weekly homework, part of which will be graded. The midterm will count for 30% of the course grade, the final exam will count for 40% . The remaining 30% will come from the homework. The course will not be graded on a curve.

I do not plan make-up exams, unless there are very good reasons for it. In any case, travel convenience is by no means a sufficient reason.

Homework/class work: Homework will be assigned every week, however, only one or two problems per sheet will be graded (these will be marked by an asterisk). The problems to be handed in are due within two weeks. This means the *beginning* of the class. No late homework is accepted.

Every correct solution to a homework problem is worth 5 points, but only one solution per problem will count. Quite often, beside the compulsory homework problems there will be more challenging extra problems (marked with two asterisks). These can also be handed in, and in case of success, they will give you 5 points. The two-week rule applies here as well.

You are strongly encouraged to discuss homework problems with other students in the course, but please write up solutions in your own words. You are supposed to understand your own solutions in full detail. If you rely on sources different from the course notes, it is expected that you name these sources and the extent you have made use of them.

No class attendance will be taken.