

Math 137: Algebraic Geometry

Spring 2022

Syllabus

Prerequisites

This is an undergraduate course on Algebraic Geometry.

Basic algebra (fields, rings, modules, polynomial rings) is a prerequisite. For example, you could learn this by taking math 123, or from chapters 11, 14.1, 14.5, 14.6, 15.1-15.6 of Michael Artin's Algebra.

Tentative list of topics

Affine and projective varieties, Hilbert's Nullstellensatz, Gröbner bases, dimension theory, tangent spaces, curves, intersection numbers, Bézout's theorem, divisors and linear systems, Riemann–Roch theorem

References

We will follow *Algebraic Curves* by WILLIAM FULTON to some extent:

<http://www.math.lsa.umich.edu/~wfulton/CurveBook.pdf>

I also highly recommend Brooke Ullery's lecture notes:

<http://people.math.harvard.edu/~bullery/math137/>

Other good references are:

- Chapter I of *Algebraic Geometry* by ROBIN HARTSHORNE
- *Algebraic Geometry* by JOE HARRIS
- *An Invitation to Algebraic Geometry* by KAREN E. SMITH, LAURI KARANPÄÄ, PEKKA KEKÄLÄINEN, and WILLIAM TRAVES
- *Undergraduate Algebraic Geometry* by MILES REID

Grading

There will be weekly homework.

Furthermore, there will be a take-home exam at the end of the term.

The final grade will be 70% based on homework and 30% on the final exam. The two lowest homework scores will be dropped.

You are encouraged to collaborate on homework, but must write the solutions up independently. Remember to always acknowledge collaborators and other sources on homework assignments. Collaboration on the final exam is forbidden. No external sources are allowed on the final exam, except the lecture notes (either those on the course website or those made by the student), problem sets, and solutions to problem sets.