Math 631: Algebraic Geometry I
Fall 2021
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Algebraic geometry is the study of algebraic varieties, i.e. the geometric objects defined by systems of polynomial equations. It is one of the most central subjects in mathematics, with applications ranging from complex geometry to number theory, commutative algebra, representation theory, combinatorics, mathematical physics, and beyond.

The foundation of modern algebraic geometry is scheme theory, as pioneered by Grothendieck. Besides giving a powerful framework for proving results about algebraic varieties, it is essential for many of the applications to other subjects mentioned above.

The goal of this course is to develop the language of schemes.

Time and place. Tuesday and Thursday 11:30 am – 1:00 pm in 455 Weiser

Course webpage. http://www-personal.umich.edu/~arper/AG1/

Office hours. Tentatively: Thursday 2:30 – 3:30 pm or by appointment

Textbook. There are many possible references for the course material, including:
- *Algebraic Geometry* by Hartshorne.
- *Foundations of Algebraic Geometry* by Vakil.
- *Algebraic Geometry I* by Görtz and Wedhorn.
- *The Stacks Project*.

We will follow some combination of these sources.

Prerequisites. I will assume comfort with commutative algebra and point set topology. Familiarity with the basics of category theory would also be useful, but will be reviewed or relegated to exercises as needed.

Homework. There will be weekly problem sets posted on the course webpage. You are encouraged to collaborate on problem sets with your classmates, but you should write up your solutions independently and include a written acknowledgement of your collaborators.

Final exam. There will be a take-home final exam.

Grading. Grades will be based on homework (70%) and the final exam (30%).