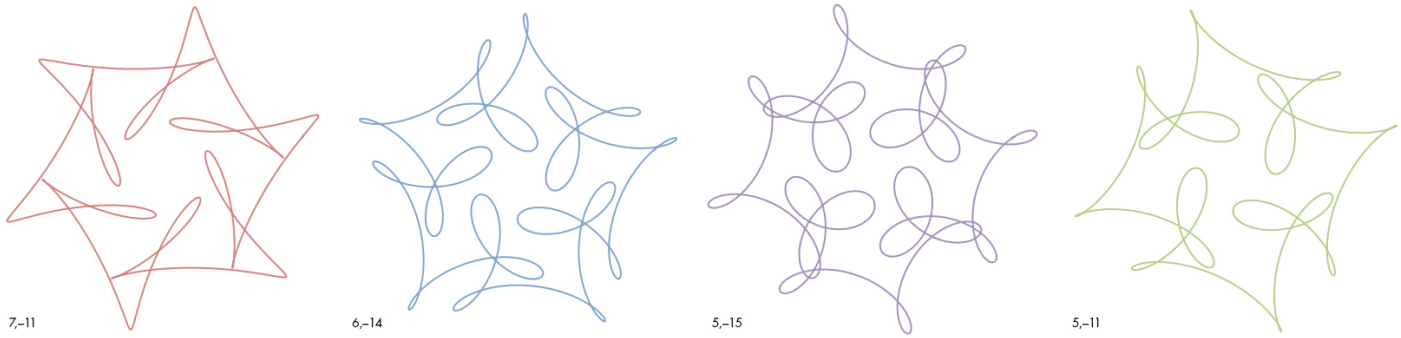
Math 598, Algebraic Curves

Fall 2020



Algebraic curves are a gentle introduction to algebraic geometry. The two approaches to this subject are algebra (ring theory) and geometry ('Riemann surfaces'). In this course, we will encounter both approaches and how each helps to develop intuition for the other.

Algebra: We start with Hilbert's Nullstellensatz, i.e. the idea of points corresponding to ideals, and then cover affine and projective curves, resolution of singularities, building to the Riemann–Roch theorem.

Geometry: Riemann's idea was to glue together copies of the complex numbers and see what happens. This results in the theory of curves over the complex numbers, also known as Riemann surfaces.

Prerequisites and pace. Algebra and some comfort with complex numbers. The pace of the course will be adjusted to the audience and the circumstances.

Grading. Students will be expected to post short (20 25 min.) videos once every few weeks summarizing and expanding the material.

Textbooks. Fulton: Algebraic Curves. (freely available online.) Also recommended are the books on Riemann surfaces by Forster, and by Farkas and Kra.

Class Time Tuesdays, Thursdays 3 – 4:15, online. Please email the instructor if interested, fsprung@asu.edu.