

Math 595: Algebraic curves and surfaces

Spring 2017

Time: MWF 1–1:50pm (beginning 13 March).

Location: 441 Altgeld Hall.

Instructor: Emily Cliff.

Office hours: MW 2–2:50pm (or by appointment).

Prerequisites: It will be assumed that most students will be (at least moderately) familiar with the material in Chapters II and III of Hartshorne’s *Algebraic Geometry*, that is, foundations of schemes and their cohomology. However, if you are interested and motivated, and willing to do some independent reading, I will work with you to make it possible for you to follow and benefit from the course. In that case please contact me before registering.

Course content: We will cover selected topics from Chapters IV and V of Hartshorne’s *Algebraic Geometry*. The idea is to work with applications of the concepts from Chapters II and III to concrete examples of curves and surfaces.

More specifically, we will begin our study of curves with a discussion of the Riemann-Roch theorem. We will then discuss two ways of explicitly representing and studying curves: as a branched covering of \mathbb{P}^1 , or as a curve embedded in a higher dimensional projective space. We will also discuss topics in the geometry of algebraic surfaces. In particular we will study ruled surfaces, and see how we can use our knowledge of curves to gain a better understanding of these surfaces. We will also look at the example of non-singular cubic surfaces in \mathbb{P}^n .

These topics are not set in stone; students with particular interests building on (or confusions relating to) the theory of schemes should feel free to suggest topics that are exciting or helpful to them, before or during the term.

Grading: Grades will be assigned mostly on the basis of attendance and participation. Problem sets will be assigned; they will not be mandatory but students should not expect to internalize much of the material without engaging with examples such as those on the problem sets.