

INTRODUCTION TO ALGEBRAIC GEOMETRY, MATH 60710, FALL 2017
Instructor, Sam Evens, HH 222, sevens@nd.edu, MWF 11:30–12:20

I will give an introduction to algebraic geometry. I will begin the course with the definitions of affine and projective varieties, and we will prove the Hilbert nullstellensatz, which establishes an equivalence between affine algebraic sets and finitely generated reduced algebras. We will interpret this equivalence as giving a way to study a geometric object by studying its functions. I will proceed to cover general abstract varieties, and notions such as irreducibility, dimension, morphisms, tangent spaces, and curves. We will discuss also sheaves and schemes.

COURSE WEBSITE : www.nd.edu/~sevens/60710.html

PREREQUISITES: In principle, this course should be understandable to a student who has completed the first year of graduate algebra (60210-60220). I will introduce concepts of commutative algebra as needed, but will begin with material from chapter 15 of Dummit and Foote.

There are many sources that are useful. I will roughly speaking follow Hartshorne, but will supplement it with many other sources. I will try to make the source I am using clear at all times, but students should ask if they are unsure.

“Algebraic Geometry” by Robin Hartshorne, Springer. 2010.

“Abstract Algebra” by David S. Dummit and Richard M. Foote, 2003.

“Linear Algebraic Groups” by James E. Humphreys, Springer, 1975.

“Introduction to Commutative Algebra” by Michael Francis Atiyah and I. G. MacDonald.

“Commutative Ring Theory” by H. Matsumura and Miles Reid, Cambridge.

The algebraic geometry course notes by J.S. Milne, available at
<http://www.jmilne.org/math/CourseNotes/ag.html>

“Faisceaux Algébriques Cohérents” or “FAC”, by J-P Serre, Ann. of Math. (2) 61, (1955). 197278 (it is easy to find an English translation online, ask if you need help).

HOMEWORK: I will give 4 or 5 homework assignments during the semester. These will be posted on the course website. I will be accomodating for students beyond the first year of graduate school who are busy preparing for oral exams or working on their thesis. I plan to spend some class time discussing homework problems. There will be no exams.