Math 145. Algebraic Geometry

Instructor: Pablo Solis, 384-F Sloan Hall, `sopablo@math.stanford.edu`
Course Assistant. Lie Qian, 380-S Sloan Hall, `lqian@stanford.edu`
Textbook. Algebraic Curves (Fulton). Available for free (legally!) at course webpage.

Office Hours. Solis: M 3:45 - 5 WF 2:30pm–4pm and by appointment. Qian: Tu 3-4, Th 3-5.

Homework and exams: Homework will be assigned on Fridays and will be due *in class* (at the start of lecture) on the following Friday. *The lowest homework grade will be dropped*, and a missed homework will count as a 0. Late homeworks will not be accepted for any reason whatsoever (i.e., they count as 0).

The grade will be based on 70% for homeworks (all counting equally towards the final grade) and 30% for a take-home final exam; there will be no mid-terms. It is permissable (and even encouraged!) for students to discuss the exercises with each other.

It is *EXTREMELY IMPORTANT* to do the homework every week! This subject involves an absolutely huge number of new ideas, and constant practice is the only way to absorb them all.

Course description Algebraic geometry was classically concerned with the geometric study of solutions to polynomial equations in several variables over $\mathbf{C}$, and in the first half of this century it was put on a firm foundation by Zariski, Weil, and others, using the (then new) methods of commutative algebra. This course will be concerned with developing some basic concepts of the subject over an arbitrary algebraically closed base field. Of course we will consider plenty of examples over curves that are not necessarily algebraically closed.

Some specifics topics include: algebraic varieties and maps between them, intersection theory for plane curves, blow-ups and resolution of singularities for curves, and the Riemann-Roch theorem.

Prerequisites In order to cover a reasonable amount of material, I will assume you have been exposed to abstract algebra at the level of Galois theory (including fields of positive characteristic). We will develop most of the commutative algebra that we need. Also some previous exposure to the concept of manifold and abstract topological space (without metric) is helpful, though none of the non-trivial theory of these concepts is required.