

Course 3

Equations defining projective varieties

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Abstract:

I will discuss a body of work loosely centered around the algebraic properties of projective varieties. On the one hand, classical results about defining equations for curves and abelian varieties have emerged as the first cases of general statements for higher syzygies, and the picture for very positive embeddings of higher-dimensional varieties has started to come into focus. In another direction, concerning a natural measure of the algebraic complexity of varieties, a fascinating but mysterious dichotomy has emerged between the behavior of smooth varieties and arbitrary schemes.

While the questions are motivated by algebra, the ideas and tools are very geometric, ranging from the geometry of vector bundles and Hilbert schemes to vanishing theorems for multiplier ideals and Fourier-Mukai transforms. This lecture series will attempt to provide a broad survey of this circle of ideas, aimed particularly at geometrically-oriented algebraic geometers.