

Titolo del corso: Topics in Algebraic Geometry: Fano varieties.

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Ore frontali di lezione: 20

Periodo di lezione: Secondo semestre 2025/26

Settore/i disciplinare del corso: MATH 02/B

Tipologia di corso: Base

Modalità di verifica dell'apprendimento: Seminari ed eventualmente esercizi

Abstract del corso: Our aim is to address as many algebraic and geometric tools as possible that are pivotal in the modern study of Fano varieties. We will start with the case of Del Pezzo surfaces and the study of the geometry of homogeneous spaces, eventually retracing the classification in dimension three by Mukai and Mori-Mukai. We will analyze their rationality properties in low dimensions and introduce connections with hyperkähler geometry. Finally, we will tackle some recently studied topics in the ongoing effort to classify such varieties in dimension four, such as the birational and biregular connections with quiver moduli spaces and Fano varieties of K3 type.

Programma del corso:

1. Standard tools in algebraic geometry inspired by representation theory: homogeneous spaces, Borel-Bott-Weil theorem, Littlewood-Richardson rule, Griffiths residues, Projective duality etc.
2. Birational geometry and minimal model program for surfaces.
3. Del Pezzo surfaces, birational and biregular classification.
4. Fano 3-folds: Mukai classification of prime Fano 3-folds.
5. Some special higher dimension Fano varieties: the cubic fourfolds. Its rationality properties, and link with hyperkaehler geometry.