

Polyhedral structures in algebraic geometry

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Timetable: 16 hrs. First lecture on March 11, 2025, 14:30 (dates already fixed, see Calendar of Activities on <https://dottorato.math.unipd.it/calendar/>), Torre Archimede, Room 2AB40.

Credits: 3

Course requirements: Good knowledge of commutative algebra, projective geometry and algebraic geometry

Examination and grading: Presentation of a part of a research paper

SSD: MAT/03

Aim: Understand how some deep geometric problem can be translated by a simple polyhedral object.

Course contents:

Algebraic geometry studies the zero locus of polynomial equations connecting the related algebraic and geometrical structures. In several cases, nevertheless the theory is extremely precise and elegant, it is hard to read in a simple way the information behind such structures. A possible way of avoiding this problem is that of associating to polynomials some polyhedral structures that immediately give some of the information connected to the zero locus of the polynomial. In relation to this strategy I will introduce Newton-Okounkov bodies and Tropical Geometry, underlying the connection between the two theories

Bibliography:

KL K\"uronya, A., Lozovanu, V., Local positivity of linear series, arXiv:1411.6205v1 (2014)

PAGI Lazarsfeld, Robert, Positivity in algebraic geometry. I, Classical setting: line bundles and linear series, Springer-Verlag, Berlin, 2004.

PAGII Lazarsfeld, Robert, Positivity in algebraic geometry. II, Positivity for vector bundles, and multiplier ideals, Springer-Verlag, Berlin, 2004.

LM Lazarsfeld, R., Mustaă, M., Convex bodies associated to linear series, Ann. Sci. Ec.Norm. Supér. (4) 42 (2009), no. 5, 783-835.