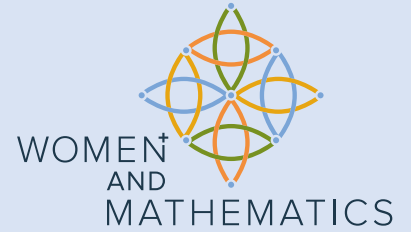


Convexity and Combinatorics in Algebraic Geometry

MAY 18-23, 2025



UHLENBECK LECTURE COURSE

Tropical Geometry

Melody Chan | Brown University

Tropical geometry is a modern degeneration technique in algebraic geometry. Think of it as a very drastic degeneration in which one associates a limiting object to a family of algebraic varieties that is entirely combinatorial. I will introduce tropical geometry through the beautiful topics of tropical curves, tropical abelian varieties, and their moduli spaces.

Prerequisites: Exposure to combinatorics and graph theory, and a semester of algebraic geometry or algebraic topology.

TERNG LECTURE COURSE

Log-concavity and Matroids

Cynthia Vinzant | University of Washington

Matroids are combinatorial structures that model independence, such as that of edges in a graph and vectors in a linear space. I will introduce the theory of matroids along with their surprising connection to a class of multivariate polynomials that are log-concave on the positive orthant. Log-concavity is an important feature of many functions and discrete sequences appearing across mathematics, including combinatorics, algebraic geometry, convex analysis, and optimization. We will explore the real and combinatorial geometry underlying log-concavity along with applications to matroids and the mixing times of random walks.

Prerequisites: Linear algebra and some exposure to each of algebra, combinatorics, graph theory, and probability.

ORGANIZERS

Wei Ho | IAS/University of Michigan/Princeton University, Director

Michelle Huguenin | Institute for Advanced Study, Program Manager

Dusa McDuff | Barnard College and Columbia University, Professor

APPLICATION DEADLINE IS FEBRUARY 14, 2025

For more information, please visit:

www.ias.edu/math/wam/program-years/2025-program-women-and-mathematics

W⁺AM is most grateful for renewed funding from the National Science Foundation, Lisa Simonyi, the Robert S. Hillas Fund, the Minerva Research Foundation and Princeton University Department of Mathematics. Their generous support enables W⁺AM to continue its mission to recruit and retain more women in mathematics through new and sustained initiatives. W⁺AM is open to all that support its mission regardless of gender.

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