

MATH 595 TV
TORIC VARIETIES
SPRING 2023

Time and Room: TuTh 12:30–1:45, 113 Davenport

Instructor: Sheldon Katz

Office and Hours: 301 Altgeld, by appointment

Course website: <https://faculty.math.illinois.edu/~katz/class/s23/>

Text: Introduction to Toric Varieties, W. Fulton, Annals of Math Studies 131, Princeton University Press, Princeton NJ 1993.

Supplementary Texts: Mirror Symmetry and Algebraic Geometry, D.A. Cox and S. Katz (Chapter 3 only), and Toric Varieties, D.A. Cox, J. Little, and H. Schenck.

Books on reserve: A request has been sent to the Mathematics Library to place all of the above books on reserve.

Prerequisites: Modern Algebraic Geometry (Math 512) (preferred), or Math 511 plus an independent read of Chapter II.2 of Hartshorne's Algebraic Geometry or similar material in a different text.

The first-half minicourse will introduce normal toric varieties, which can be described by fans, and projective toric varieties, which can be described by polytopes. For toric varieties which are both normal and projective, the dictionary between the two descriptions will be explained. Toric geometry will be used to describe line bundles and their cohomology, differentials, Serre duality, the Mori cone, Chow groups, and more.

Homework and Grades: Homework problems will be assigned but not graded. Homework problems will be solved by students in problem sessions which will be held during regular class times. Weekly readings and homework assignments will be posted on the course website.