

**MATH 595: INTRODUCTION TO NAKAJIMA QUIVER
VARIETIES, FALL 2018**

Course Meets: First half of the semester, MWF, time TBA

Instructor: Thomas Nevins (nevins@illinois.edu)

Prerequisites: Math 500; Math 510 or Math 511 or some basic knowledge of algebraic varieties.

Course Web Page: <http://www.math.uiuc.edu/~nevins/courses/aut18/m595.html>

Nakajima quiver varieties are a special class of algebraic varieties that play an out-sized role in contemporary enumerative geometry, symplectic algebraic geometry, geometric representation theory, and mathematical physics.

This half-semester course will provide an introduction to Nakajima quiver varieties, assuming only very basic background in algebraic geometry. In particular, the construction of Nakajima quiver varieties is very concrete (and based in linear algebra!), and we will develop constructions from deeper within algebraic geometry (some geometric invariant theory and moduli theory) largely from scratch and only as needed.

The course will treat basic definitions and constructions; will go in-depth into various examples connected to resolutions of Kleinian singularities, Hilbert schemes, gauge-theoretic moduli spaces, and more; will explore features of symplectic geometry that are illustrated by quiver varieties; and will develop some of the ways in which quiver varieties appear in the subjects mentioned above (representation theory, enumerative geometry, physics).

I will strive to make the course self-contained in technical detail but I hope that the course will give students a glimpse of the wide mathematical world that quiver varieties inhabit. Accordingly, while there will not be homework, I hope a few students may choose to give presentations about topics that interest them and that involve quiver varieties.