

**Speaker:** Anna Medvedovsky

**Title:** Lower bounds on dimensions of mod- $p$  Hecke algebras

**Abstract:** A few years ago, Nicolas and Serre proved that the Hecke algebra acting on all mod-2 modular forms of level one is as big as it can be, isomorphic to  $F_2[[x, y]]$ . Their approach is completely explicit and surprisingly elementary — computations with polynomials and power series over  $F_2$  — but appears not to generalize beyond  $p = 2$ . Shortly after, Bellaïche and Khare generalized their result to all  $p \geq 5$  using completely different methods (via characteristic-zero results of Gouvea and Mazur). In this talk, I will present a new method, uniform and entirely in characteristic  $p$ , for deducing that mod- $p$  Hecke algebras are big. Currently implemented only in the case where the genus of  $X_0(N_p)$  is zero, this method has solid potential for generalization. The key technical result is pure algebra, combinatorial in flavor, and may be of independent interest.

The main talk will begin with a brief introduction to Hecke algebras as well as motivation for wanting them to be big. It should be accessible to anyone familiar with modular forms and Hecke operators.