

**Alex Ghitza**, University of Melbourne

Title: *On some aspects of Serre's quaternionic study of modular forms (mod p)*

Abstract: In a 1987 letter to Tate, Serre gives a bijective correspondence between the Hecke eigensystems coming from modular forms (mod  $p$ ) of fixed level and varying weight, and the Hecke eigensystems coming from some “mod  $p$  automorphic forms” on the definite quaternion algebra ramified at  $p$ . Much of the argument is geometric, restricting forms to the supersingular locus and using Serre duality to collapse the resulting long exact sequence in the sheaf cohomology of the modular curve. Serre asks what Hecke action on the Serre duals makes this an exact sequence of Hecke modules.

We discuss a fairly pedestrian approach to answering this question and indicate how it relates to work in progress (with Anni and Medvedovsky) on modular forms (mod  $p$ ) in level divisible by  $p$ . Parts of this are also joint work with Yiannis Fam.