Algebra and Geometry Seminar

Speaker: Nasrin Altafi (Queen's University)

Title: Lefschetz properties of families of graded Artinian Gorenstein algebras.

Abstract: The Hard Lefschetz Theorem on the cohomology rings of smooth complex projective varieties motivated Stanley's formulation of the Lefschetz properties for standard graded Artinian algebras. The cohomology rings of smooth complex projective varieties are Poincaré duality rings therefore graded Artinian Gorenstein algebras are the algebraic analogue of these rings. The question of whether the artinian Gorenstein algebras satisfy the Lefschetz properties is almost widely open, even in low codimension. While it is true that all Artinian Gorenstein algebras satisfy the Strong Lefschetz property in codimension two, this is unknown in codimension three, however it is conjectured to be true. The first examples of Artinian Gorenstein algebras without Strong or Weak Lefschetz properties can be found in codimension four.

In this talk, we go over some methods, specifically the Hessian criteria, for determining the Lefschetz properties for Artinian Gorenstein algebras. We provide a family of Hilbert functions that force the Strong Lefschetz property on Artinian Gorenstein algebras of codimension three.