Algebraic Geometry and Commutative Algebra Seminar

UNIVERSITY OF NOTRE DAME
Department of Mathematics

Speaker: Fabrizio Zanello
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Tuesday, November 23, 2010
2:00pm
125 Hayes-Healy Hall

Title: Some recent developments in the theory of pure O-sequences

Abstract:

An order ideal of monomials is a finite set X of monic monomials such that, whenever M is an element of X and N divides M, then N is an element of X. If all maximal (by divisibility) monomials of X have the same degree, X is said to be pure. A pure O-sequence is the vector enumerating the monomials of X in each degree. Pure O-sequences were introduced by R. Stanley in 1977, and play a role in a number of fields, including algebraic combinatorics, commutative algebra, matroid theory, design theory/finite geometries. In this talk I will try to give a broad, mostly non-technical overview of the theory of pure O-sequences, as well as a feeling of the algebra and the combinatorics behind it, especially in light of the most recent progress made in this area. Most of the material I will present is contained in the monograph "On the shape of a pure O-sequence", a joint work with M. Boij, J. Migliore, R. Miró-Roig, U. Nagel. My recent papers with T. Há and E. Stokes (on Stanley's matroid h-vector conjecture) and with my student J. Li (on the Weak Lefschetz property and plane partitions) will also be briefly discussed, along with the subsequent, nice bijective work of the four students of V. Reiner and D. Stanton. I will conclude the talk by mentioning several open problems/conjectures that I consider interesting, and possible future research directions in this area.