



UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

COLLOQUIUM

Dr. Jason McCullough
(UCR)

"Bounding Projective Dimension and Regularity"

Abstract:

Given a polynomial ring $R = K[x_1, \dots, x_n]$ and a homogeneous ideal I of R , one can measure the computational complexity of the ideal in several ways. One of these, is the projective dimension; that is, the minimal length of a (graded) free resolution. Another is the regularity, which roughly speaking, measures the degrees of the relations that appear in the free resolution. There is great interest in finding bounds on these two invariants of an ideal in terms of various input data, such as the degrees and number of generators, the number of variables of the ring, or the degrees of syzygies (relations) early in the resolution. In particular, Stillman's Question asks for a bound on the projective dimension of an ideal purely in terms of the degrees of the generators. This is an open problem with connections to bounding regularity as well.

In my talk I will describe some of my work in defining families of ideals with large projective dimension, thus giving large lower bounds on any answer to Stillman's Question. In particular, my coauthors and I defined a three-generated ideal with exponential projective dimension relative to the degrees of the generators. I will also talk about how these examples motivated a new kind of bound on regularity in terms of only part of the resolution of the ideal.

Wednesday, January 25th, 2012

Surge 284

4:10-5:00pm

Tea Time at 3:40pm