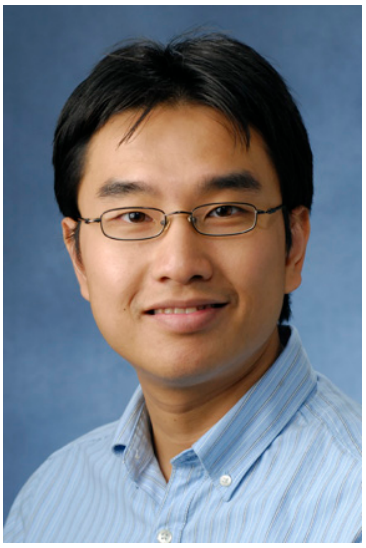
# MATH DEPARTMENT COLLOQUIUM



**Dr. Hai Long Dao**
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**Friday, Nov 20, 2015**
**3:30-4:30 PM**
**DERR 113**

## *The unreasonable usefulness of homological algebra*

Abstract: Studying a system of polynomials is a fundamental goal in mathematics. One way to understand such system is to write down the relations between the polynomials, then the relations between those relations, and so on. This process, first utilized by Hilbert with spectacular success in understanding group invariants, was the first indication of how homological algebra can be applied in commutative ring theory. More than 100 years on, and this circle of ideas has grown into a big landscape, with connections to algebraic geometry, combinatorics and much more. In this talk, which is accessible to general audience, I will try to explain these fascinating connections, with examples ranging from counting the right number of solutions of a polynomial system, to domination parameters of graphs.

Bio: Originally from Vietnam, Dr. Dao received his Bachelor of Science degree from the University of Sydney and his Ph.D. from the University of Michigan under the direction of Dr. Mel Hochster. After a post-doctoral position at the University of Utah, he settled in Kansas and is now an Associate Professor of Mathematics at the University of Kansas. He has published over 24 papers in Commutative Algebra and some related areas. Specifically, he studies aspects of the homological conjectures, which provide very surprising connections between homological and non-homological properties of modules over local rings. Topics of interest include: asymptotic behavior of Ext and Tor functors, non-commutative resolution of singularities, Hilbert-Kunz multiplicities, vector bundles on projective and (punctured) affine schemes, divisor class and Picard groups, projective dimension and regularity of edge ideals, invariants and classification of subcategories of finitely generated modules.