Discrete Mathematics Seminar

Time: Friday, 20 November 2015, 2:15 – 3:15 PM

Location: 237 Derrick Hall

Title: Projective Representation of Non-Representable Matroids (of Biased Graphs)

Speaker: Dr. Rigoberto Florez, Department Mathematics and Computer Science,
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Abstract:

A matroid is an axiomatization of the concept of linear dependence and linear independence. The independence concept is present in several areas of mathematics. Including graph theory, linear spaces and transcendental extension fields. In such cases we say that the matroid is graphic, linear or algebraic representable; respectively. However, a matroid that is representable in one area of mathematics may be no representable in another areas.

In the first part of the talk we discuss basic ideas of matroids. For the second part, we talk about "biased expansion" of K_3 and the bias matroid representability. Given a quasigroup Q there is a complete graph K_3 with multiple edges corresponding to the elements of Q. This graph give rise to two rank-3 matroids –the "full frame matroid" $G(QK_3)$ and "extended lift matroid" $L_0(QK_3)$.

When Q is a subgroup of the multiplicative or additive group of a skew field F, the two mentioned matroids are representable in the projective plane over F. Thomas Zaslavsky and I are generalizing this standard theorem to arbitrary quasigroups (this is more complicated), and the role of F being taken by a planar ternary ring associated with a projective plane.