



The rising STAR of Texas

Discrete Mathematics Seminar

Time: Friday, April 1 and 15, 2016, 2:15-3:15 PM
Room: 237 Derrick Hall
Title: Structure Theory for Oriented Hypergraphs: Parts 1 and 2
Speaker: Dr. Lucas Rusnak, Department of Mathematics

Abstract:

Incidence-oriented hypergraphs are a generalization of signed graphs that can be used to model representable matroids. We will begin by surveying some basic results that drive recent developments in the structure theory of oriented hypergraphs. These developments include the characterization of the balanced and balanceable circuits of representable matroids via hypergraphic families as well as a partial characterization of the unbalanceable circuits. We then examine a new proof of the All Minors Matrix Tree Theorem via Boolean filters and ideals of weak-walk vertex covers, and discuss how these techniques can be extended to hypergraphs via Stirling 2-orders to provide the beginnings of an All Minors Matrix Tree Theorem for any matrix. Time permitting, we will also discuss the relationship between complete hypergraphs, the Fano and non-Fano matroid, and simplicial complexes, as well as an incidence-centric version of the Havel-Hakimi algorithm for hypergraphs and discuss open questions related to optimal bounds for uniform hypergraphs.