Discrete Mathematics Seminar

Time: Friday, September 14, 2018, 2:15 - 3:15 PM
Location: 330 Derrick Hall
Title: Subspaces in difference sets in vector spaces
Speaker: Dr. Hoang Le, Department of Mathematics, University of Mississippi

Abstract:

A common theme in additive combinatorics states that if \( A \) is a subset of positive density of a vector space \( \mathbb{F}_p^n \), then the difference set \( A - A \) must contain a large subspace. Furthermore, the more sums or differences we take (e.g. \( A + A - A - A \)), the larger subspaces we are guaranteed to find. I will talk about two results in this theme. In joint work with Zhenchao Ge, we generalize and simplify the proof of a result of Sanders, which says that if \( A \subset \mathbb{F}_p^n \) has density \( 1/2 - c(p)/\sqrt{n} \), then \( A - A \) contains a subspace of codimension 1. In joint work with Pierre-Yves Bienvenu, we show that if \( A \) is a subset of positive density of \( \mathbb{F}_p^n \times \mathbb{F}_p^n \), then by doing more restrictive operations on the coordinates of \( A \), the resulting set also contains nice structures. The same result was obtained independently by Gowers and Milicevic. Time permitting, we will sketch an elementary proof of our first result.