

Math 595 HCM

Professor Balog

Many important theorems and conjectures in combinatorics, such as the theorem of Szemerédi on arithmetic progressions and the Erdos-Stone Theorem in extremal graph theory, can be phrased as statements about families of independent sets in certain uniform hypergraphs.

These hypergraphs have a clustering phenomena, which can be summarized in a general theorem, called as Container Theorem, and the method is the container method. The method seems to be surprisingly applicable for enumerating problems, extremal questions in random environment, and proving the existence of some combinatorial structures.

The course will discuss the container method, its variant, and many of its application, including in probability theory, additive number theory, discrete geometry, combinatorics and graph theory.

Grade requirement: Students should demonstrate understanding the course material, which could include read some related paper, typing up some class notes, or do some homework assignments.

Prerequisites: 412 and 413, or 580, or equivalent.