UNIVERSITY OF DELAWARE
DEPARTMENT OF MATHEMATICAL SCIENCES
DISCRETE MATHEMATICS SEMINAR

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Applications of the Regularity Method

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While many basic combinatorial results are obtained by ingenuity and detailed reasoning, the modern theory relies on deep, well-developed techniques with roots in areas such as algebra, probability, or topology.

One of the more recent techniques, referred to as the Regularity Method, employs the idea of quasi-randomness. A quasi-random object is one which shares its properties with many other objects of the same kind, thus capturing the idea of a deterministic realization of a "random object". A celebrated result due to Szemeredi, known as the Regularity Lemma, asserts that every graph can be decomposed into relatively few subgraphs that are "typical", or quasi-random. This quasi-randomness enables one to find and enumerate subgraphs of a given isomorphism type, leading to many applications.

In this talk, I will illustrate the Regularity Method on problems with connections to combinatorial geometry, extremal combinatorics and number theory. I will also discuss recent work leading to the extensions of the Regularity Method to hypergraphs.