2011-2012 Distinguished Lecture Series
UCLA Department of Mathematics

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Probabilistic Methods in Combinatorics

Lecture 1: **The probabilistic method**

Abstract: The discovery that deterministic statements can be proved by probabilistic reasoning led already more than fifty years ago to several striking results in various mathematical disciplines. It soon became clear that the method, which is now called the probabilistic method, is a very powerful tool for proving results in Discrete Mathematics.

I will describe several applications of probabilistic ideas in the proofs of combinatorial statements. The main theme is that a probabilistic point of view may be very helpful even when we are interested only in purely deterministic algorithms, or in purely deterministic mathematical statements.

Lecture 2: **The structure of large graphs**

Abstract: A property of graphs is hereditary if it is closed under deleting vertices. Many interesting properties of graphs are hereditary, and their study reveals some unexpected phenomena. This study is heavily based on probabilistic ideas together with combinatorial, geometric and analytic tools, including Szemeredi's Regularity Lemma and Grothendieck's Inequality, and leads to interesting extremal and algorithmic applications.

I will survey the topic focusing on several recent results and questions.

Lecture 3: **Random Cayley graphs**

Abstract: The study of random Cayley graphs of finite groups is related to the investigation of expanders and to problems in combinatorial number theory.

I will discuss this topic, focusing on the question of estimating the chromatic number of a random Cayley graph of a given group with a prescribed number of generators.

Lecture 1
Tuesday, November 15, 2011
2:00 - 3:00 pm
MS 6627

Lecture 2
Wednesday, November 16, 2011
2:00 - 3:00 pm
MS 6627

Lecture 3
Thursday, November 17, 2011
3:00 – 4:00 pm
MS 6627

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