Probabilistic Combinatorics, Math 595

Instructor: Renming Song
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Class Hours: MWF 1:00-1:50 P.M.

Textbook: Noga Alon and Joel Spencer: The Probabilistic Method. 3rd edition, Wiley, 2008.
Reference: G. R. Grimmett and D. R. Stirzaker: Probability and Random Processes. 3rd edition, Oxford, 2001.

The Probabilistic Method is a powerful tool in tackling many problems in discrete mathematics. This course provides an extensive treatment of the Probabilistic Method, with emphasis on methodology. We will try to illustrate the main ideas by showing the application of probabilistic reasoning to various combinatorial problems. The topics covered in the class will include (but are not limited to):

Linearity of expectation, the second moment method, the local lemma, correlation inequalities, martingales, large deviation inequalities, Janson and Talagrand inequalities, pseudorandomness, random graphs.

There will no exams for this course. Students will graded on the basis of regular written homework and optional presentations for extra credit.

9**Prerequisite**: Math 580 or instructor approval. Students need the mathematical maturity and background for graduate-level mathematics. Elementary aspects of linear algebra, probability, and graph theory are assumed.