Math 218a
Fall 2008

Probabilistic Methods (Math 218a)

Time and Place: Fall 2008, MW 2:00-3.50 P.M., MS 5147.
First class: Sept. 29, 2008
Instructor: Benny Sudakov, bsudakov@math.ucla.edu

Course description:

The Probabilistic Method is a powerful tool in tackling many problems in discrete mathematics. It belongs to those areas of mathematics which have experienced a most impressive growth in the past few decades. Roughly speaking, its basic idea can be described as follows. In order to prove existence of a combinatorial structure with certain properties, we construct an appropriate probability space, and show that a randomly chosen element of this space has the desired property, with positive probability.
This course provides a gentle introduction to 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 inequality and pseudo-randomness.

Text books:

The Probabilistic Method, by N. Alon and J. H. Spencer, 2nd Edition, Wiley, 2000