

21-737 Probabilistic Combinatorics
Spring 2017 Tom Bohman

- Course description: This course covers the probabilistic method for combinatorics in detail and introduces randomized algorithms and the theory of random graphs. Methods covered include the second moment method, the Rödl nibble, the Lovász local lemma, correlation inequalities, martingale's and tight concentration, Janson's inequality, branching processes, coupling and the differential equations method for discrete random processes. Objects studied include the configuration model for random regular graphs, Markov chains, the phase transition in the Erdős-Rényi random graph, and (time permitting) the Barabási-Albert preferential attachment model.
- Text: There is no official text. The following books contain a substantial proportion of the material we will cover.
 - *The Probabilistic Method*, N. Alon and J. Spencer.
 - *Markov Chains and Mixing Times*, D. Levin, Y. Peres and E. Wilmer.
- Prerequisites: 21-701 Discrete Mathematics.
- Web page: <http://www.math.cmu.edu/~tbohman/21-737/pc.html>
- Office hours: Wednesday 3:00-4:30 or by arrangement. My office is Wean 6105. I can be reached by e-mail at tbohman@math.cmu.edu.
- Homeworks: Five homework assignments will be given during the semester. Discussion of the homeworks is permitted, but collaboration on the writing of the assignments is not (i.e. you are NOT permitted to see the actual pages another student is handing in).
- Final Exam and Paper Presentations: Each student must either take the final exam or present a research paper to the class. Undergraduates must take the final exam. Graduate students who have not yet passed the qualifying exam are encouraged to take the final exam.