Course Outline — Combinatorial Mathematics, Math 580, Fall 2021

Professor József Balogh, Classes are MWF: 12:00-12:50, Altgeld 447;
e-mail: jobal@illinois.edu,   **Office Hours:** After class and by appointments.
Study sessions: via: Wednesdays 3:00-4:40pm; location: 447AH.
Web page: https://faculty.math.illinois.edu/~jobal.

Topics: The Probabilistic Method is a powerful tool in tackling many problems in discrete math- ematics. It belongs to those areas of mathematics which have experienced a most impressive growth in the past few decades. 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) the first 9 chapters of the text book + many additional topics.

TEXTBOOK: Most of the topics covered in the course appear in the following book: Other topics appear in recent papers. The Probabilistic Method, by N. Alon and J. H. Spencer, 4th Edition, Wiley,

Test: Likely at: November 11 Thursday 5-7 pm

REQUIREMENTS: There will be about six homework assignments, in order that the students could check their understanding of the material. Each consists of about 6 problems. The first part of the course studies standard methods. There will be an evening exam on it. Additionally some homework and exams are possible. To make up lost points from the homework, a research paper could be presented in the class, in case the class size is above 15, it is not recommended. Class attendance is **highly recommended**, showing up late or missing a class or cell-phone ring is not nice. To excuse a miss official policy of the university is followed (doctoral note, etc...)

A homework assignment is 30 points, the test is 120 points.

The grading: 80% - : A, 75%- : A^-, 70%- :B^+, 65% - : B, 60% - : B^-, 55% - : C^+, 50% - : C, 45%- : C^- etc. Note that the writings of the solutions must have a high quality and typed, if the argument is messy or not typed then even if the solution is correct it could be returned without grading with 0 points.

Late homework policy: In case the homework is not submitted on time, it could be submitted for the next class, with losing 10% of the score. However it might be accepted at most twice during the semester from the same student. If there is official or medical reason then try to notify me in as soon as possible via e-mail.

PREREQUISITES: There are no official prerequisites, but students need the mathematical maturity and background for graduate-level mathematics. For example, basics of linear algebra, probability and graph theory are assumed to be known. Students need to be **independent**.

RESOURCES: Electronic mail is a medium for announcements and questions. I will use the e-mail given in the system, I am not responsible in case it is not monitored. Students are supposed to use illinois.edu e-mails. Some of the communication will be via MOODLE (that is likely, will be confirmed probably at the first week of classes)