THE PLAN FOR MATH-467: PROBABILISTIC METHODS IN COMBINATORICS (SUBJECT TO CHANGE)

Professor: Adam Marcus

Book: The Probabilistic Method by Alon and Spencer[1]

Communication: All communication will go through Moodle, so please register there to ensure you get announcements. Problem sets and notes will be posted to Moodle, and the links for Zoom sessions will be announced there as well. At the beginning, links to Zoom sessions will be announced directly before the session starts. Once we reach a pattern, there will likely be fixed links posted to Moodle.

Class: Fridays 1:00 - 3:00 in MA A3 30

The plan is that I will

(1) teach class live (in MA A3 30, for those who are allowed to attend that day)
(2) stream class on Zoom (for those not allowed to attend that day)
(3) post a video of the stream on SWITCHTube

We will be using the recommendations listed by EPFL: `https://www.epfl.ch/campus/security-safety/en/health/coronavirus-covid19/students/rotating-student-groups/`

Bachelors/Masters students:: The rules above dictate who is allowed on campus — if you are allowed on campus then you are welcome to come to the live class. Otherwise, you are asked to view the stream from home.

Doctoral students:: While your presence on campus is dictated by your group, I still ask that you also respect the schedule above when it comes to attending class. If it is not a day for your SCIPER number, you are asked to view the stream from your office (or home, if you prefer).

Problem session: Fridays 3:00-5:00 (canceled the first week)

The plan is to have three problem session resources

(1) I will stay in the classroom to address questions from anyone who is allowed to be there.
(2) A teaching assistant will be on a Zoom stream to address questions from Bachelor's/Master's students who are not allowed to attend that day.
(3) A second teaching assistant will be in their office to address questions from Doctoral students that were not allowed to attend that day.

Exercises related to a lecture on day x will be posted on (approximately) day $x+3$ with the intention that you will be able to ask questions and get help during the problem session on day $x+7$.[2] In particular, this means that

The problem session on September 18 is canceled!

[1] As far as I can tell, the material covered during this time should be (more or less) the same in all editions of the book, so any edition should be fine.

[2] To be clear: you are welcome to ask any questions you have about any of the problem sets at any of the problem sessions (there are no restrictions to only asking about the most recent problem set).

Material: The class will consist of two somewhat distinct parts:

First 10-11 weeks:: We will follow the book, approximately one chapter per week. We will not do all of the sections in each chapter — the goal will be to see as many topics and techniques as possible without spending too much time worrying about some more of the more technical proofs and applications.

This part will be quite applied in terms of material — that is, the focus will be more on *solving problems* (and techniques for solving problems) as opposed to *proving things*. Proofs will sometimes be presented in class, but usually as a way to show that a certain technique actually finds the correct answer.

Exercises from this part will include few (if any) proofs (both on the problem sets and on the final exam).

Final 3-4 weeks:: We will go deeper into the final topic of the first part, "Quasirandomness", with the goal of seeing a very recent proof of the existence of bipartite Ramanujan graphs of all degrees. The material will be outside the scope of the book, and notes will be provided.

This part will be more theoretical in terms of material — the focus will still on solving problems, but we will need to build some more advanced tools (which will require some amount of proving things).

Exercises from this part will likely include some basic proofs (both on the problem sets and the final exam), but formality will not be stressed.