Discrete Mathematics I
Summer 2020

Instructors
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Course webpage `http://discretemath.imp.fu-berlin.de/DMI-2020/`

Whiteboard site `https://mycampus.imp.fu-berlin.de/portal/site/9ed88c22-3df6-41f8-81a1-8c5bb4e2daef`

Schedule There will be two lectures each week, taking place on Tuesdays and Wednesdays from 14:15 to 15:45 and two exercises classes taking place on Tuesdays 16:00 to 17:30 and on Wednesdays from 08:30 to 10:00. The material covered during the two exercises classes each week will be identical so you should aim to attend one out of the two. The lectures and the exercise classes will take place on the Cisco Webex Meetings platform, with the link to the meeting available on the Whiteboard site.

Topics of the course

- Enumeration (twelvefold way, inclusion-exclusion, double counting, recursions, generating functions, inversion, Ramsey's Theorem, asymptotic counting)
- Discrete Structures (graphs, set systems, posets, matroids)
- Graph Theory (trees, matchings, connectivity, planarity, colorings)

Literature

- M. Aigner: Diskrete Mathematik
- R. Diestel: Graph Theory
- J. Matousek, J. Nesetril: An invitation to Discrete Mathematics
- D. West: Introduction to Graph Theory

Prerequisite LinAlg I-II, Analysis I-II

Final Exam The grade for the course is based solely on the final exam. The formal and time of the final exam will be announced on a later time.

The final exam will be a closed-book/closed-notes written exam. It will test both

(a) Lexical knowledge: being able to recall precisely all definitions/theorems from the lecture and explain their proofs.

(b) Problem solving: creatively applying the encountered theorems and methods to solve problems.

Exercise sheets There will be 11 Exercise Sheets. They will be usually released by Wednesday afternoon at **Whiteboard** and will be due the following Monday 23:59. Please submit your solutions on Whiteboard in a .pdf format. We recommend that you write your solutions in LATEX. Alternative you can hand-write your solutions, scan them or take a picture (using a photo-scan app may produce better results than using just your camera) and then convert the produced document to a .pdf using a pdf converter (there are free pdf converter online). It is your responsibility that your solutions are legible. Illegible solutions will NOT be graded. Late submissions will NOT be accepted.

Submission of Solutions Please submit your solutions in pairs. Indicate which two solutions you would like to have graded. At the beginning of each solution please state the name of the person who wrote it up for the pair.

Aktive Teilnahme To obtain the aktive Teilnahme credit you have to

- obtain at least 60% of the available points on the exercises sheets (there will be 11 sheets in total),
- be the author of 9 submitted solutions,
- present 1 solution during an exercise class.

(Example: Alice and Bob submit the solutions for exercise sheet 3 together. They indicating for grading exercise 1, written by Bob and exercise 4 written by Alice. The two exercises receive grades 7 and 8 respectively.

For the above submission both, Alice and Bob receive 15 out of the 20 points

for exercise sheet 3. In addition both of them are the author of a single submitted solution which counts toward their individual goal of submitting 10 solutions.)

HINTS: To succeed on the final, regular, hard work is necessary throughout the semester. It is impossible to learn everything at the end. No week can go by without making sure the lecture material is digested, and the solutions of all exercises are understood.

- Doing math TOGETHER is FUN! It is strongly encouraged to talk through the homework in study groups, throw ideas around, and come up with solutions together.

- It is very important though that to write up the solutions by yourself—just as you will on the final exam.

- Finding solutions on the internet for any homework exercise is quite easy, but is strongly discouraged. Such copied solutions will never give you the deep understanding necessary to succeed on the final. You simply cannot spare the time you struggle while thinking about exercises alone, or together with your study group. And actually, why would you want to spare it: this very struggle is the creative and most fun part of mathematics—and of our course as well!

- Feel free to contact us (by e-mail or in Whiteboard) if there are any questions concerning the lecture or the exercises. Let us know your thoughts about any particular exercise: what you have tried, where you got stuck, and feel free to ask for hints based upon them."