

Discrete Mathematics III — Summer 2012

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Time: Lectures/Exercises: Tuesdays, 12:30-14:00, Wednesdays 8:30-10:00.

Occasional make-up lectures: Monday 8:30-10:00.

Course webpage: <http://discretemath.imp.fu-berlin.de/DMIII-2012-Summer/>

Topics of the course finite fields, projective planes, algebraic and probabilistic constructions, eigenvalues of graphs and their connection to quasirandomness, applied to

- Turán-type problems
- Ramsey-type problems

Prerequisite: basic extremal graph theory, combinatorics, algebra, probability and calculus

Requirement for "active participation at the exercises". There will be about 10 sheets of exercises. You should try to solve and write up all exercises for yourself, because you will face some of them on the final exam. Each week submit solutions for two exercises, those you would want to be corrected. For the signature on the exercises you must achieve 60% of the total score (for each exercise the same score will be given).

You will usually have two weeks to think about each sheet, but always at least one. The new exercise sheet will normally be placed on the web shortly after the end of the Wednesday lecture. You should submit your solutions by the time written on them, no late submissions. However, an exercise is "alive" for submission until it is discussed at the exercises.

It would be great if you thought about and discussed the exercises in small groups. You are encouraged to submit your solutions in pairs. At the beginning of each solution note the name of the person who wrote it up; every student must write up at least four times (out of the ten).

You are welcome to ask for a **hint** for the solution of any exercise, you can do this in email or in person. Hints make sense if you thought about the

exercise before and had some tries which failed or lead to nowhere. You are encouraged to describe these when asking for a hint.

Furthermore, each student must present at least once a correct solution at the board.

In conclusion, for the exercise session credit you need to fulfil each of the following:

- achieving at least 60% of the point value of $2 \times 10 = 20$ homework problems,
- writing up the solutions yourself at least four times (besides writing the name of the two authors, on each solution you should state who the scribe was),
- presenting at least once a correct solution at the board.

Final. The grade for the course is based solely on the final exam,. The final takes place on July 11th from 8AM (sharp) to 10AM in 007/008, Arnimallee 6. The make-up final exam will be on September 25th, 10:00 (sharp) - 12:00 in HS 001, Arnimallee 3.

There will be three different type of exercises at the final:

- Definitions, statement and proofs of theorems.
You should know all the material presented at the lecture.
- Problems from the exercise sheets.
You should know how to solve all homework exercises.
- New problems
You should be able to apply the encountered theorems and methods to solve exercises you have possibly never seen.

Literature. There will be no lecture notes. The material is taken mostly from my lecture notes available in the library (Handapparat). The following books, which are also placed on the Handapparat in the mathematics library, also contain interesting further reading:

- N. Alon, J. Spencer: The Probabilistic Method
- R. Diestel, Graph Theory (both German and English editions).
- S. Jukna, Extremal Combinatorics
- D. West: Introduction to Graph Theory