Discrete Mathematics III
Summer 2014

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Place: Arnimallee 6, SR 032 Seminarraum
Lectures: Monday, 12:00-14:00
Exercises: Tuesday, 12:00-14:00
Office Hours: Tuesday 10:00-12:00 in the instructor's office. Meetings can be also arranged by appointment.

Topics of the course

- Analytic combinatorics: symbolic method, singularity analysis, study of generating functions, examples.
- Map enumeration: counting formulas for maps, bijective proofs, connections with other disciplines.
- Additive combinatorics (introduction): methods in additive combinatorics, first results in the area.

Requirement for active participation at the exercises

- There will be 9 sheets of exercises.
- You should try to solve and write up all exercises for yourself, because you will find some of them on the final exam. There will be two type of problems: short exercises and long problems (the type of the problem will be indicated in each problem sheet). Each week submit solutions for either *one* long problem or *two* short exercises, those you would want to be corrected. Short exercises will be qualified up to 10 points, and long problems will be qualified up to 20 points.
- For the signature on the exercises you must achieve 60 % of the total score (for each exercise the same grading will be given). This means a total score of 108 out of 180 points.
- You will usually have between two and three weeks to think about each sheet. The new exercise sheet will normally be placed on the web shortly after the end of the Monday lecture. You should submit your solutions until the end of the appropriate Monday lecture. It is not possible to submit the solutions later.
- 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; in the case of choosing a long problem, you should split the resolution among the components of the team. Every student must write up at least *four* times.
- Furthermore, each student must present at least *once* a correct solution at the board.

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

- achieving at least 60 % of the point value (108 points),

- 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 scriber 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 exam will be an oral exam. The possible days for the oral exam are **July 16th, 17th, 18th, 21st, 22nd, 23rd**. During the month of June the schedule will be defined.

The make-up final exam will be a written exam on **September 16th from 11:00 to 14:00**, at **SR031** (Arnimallee 6). The material you should now for both exams is the following:

- 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.

Bibliography: Very specific bibliography and some research papers (and surveys) will be linked in the webpage as soon as they appear in the lectures. The main book we will use is *Flajolet, Sedgewick: Analytic Combinatorics* (which can be downloaded from the webpage of the first author). Additional bibliography is the following:

- *Lando, Zvonkin: Graphs on Surfaces and Their Applications.*
- *Stanley: Enumerative Combinatorics Vol 1 and 2.*
- *Goulden, Jackson: Combinatorial Enumeration.*

In the last part of the course we will use *Tao, Vu: Additive Combinatorics*.