Hauptseminar Diskrete Optimierung

Exact Exponential Algorithms, Mon 14–16

(Ulrich Brenner, Stephan Held, Stefan Hougardy, Jens Vygen)

Hauptseminar Algorithmen und Optimierung

Submodular Maximization, Fri 14–16

(László Végh, Wenzheng Li, Tamás Schwarcz)

Structure of the Seminar Talk

Each talk should be structured as follows:

1. *Part 1* (10–20 minutes)
   Give an introduction to the topic of the talk.
   Explain what the main results of the talk will be.
   Explain why these results are interesting or important.
   Place the topic in a broader context, for example by making connections to other talks in the seminar or by discussing related results from the literature.
2. *Questions for the audience*
   One or two multiple-choice questions by the speaker for the audience.
   This is also a good opportunity for the audience to ask questions.

Structure of the Seminar Talk

Each talk should be structured as follows:

1. *Part 1* (10–20 minutes)
2. *Questions for the audience*
3. *Part 2* (55–65 minutes)
   This is the main part of the talk, where you should primarily present proofs. If there is not enough time for all details, present at least the main ideas.
4. *Discussion*
   Questions from the audience to the speaker.

The two parts of the talk together must not exceed 75 minutes.

If you use definitions or proofs from previous talks, remind the audience by giving a short recap.

What We Expect from You

- Prepare a talk on the topic assigned to you, including questions for the audience.
- Prepare a 1–2 page handout summarizing the most important definitions and results of your talk. This handout should be distributed to the audience before your talk.
- Give a practice talk about 2–3 weeks before the actual talk.
- Participate actively in the discussions during the seminar.
- Try to give your talk as freely as possible.

In addition to the assigned section, it may often be necessary or helpful to use further sources.

Assignment of Topics and Registration

If you would like to participate in the seminar, please send an email to Ulrich Brenner (brenner@or.uni-bonn.de) with your name and topic preferences by

Monday, July 20, 2026, 10:00.

We will inform you by email about the assignment of topics a few days later.

After the topics have been assigned, you will have one week to register bindingly. After that, students on the waiting list may be offered a place.

In addition, you must register in BASIS at the beginning of October.

All participants will be assigned supervisors who can help with questions.

Exact Exponential Algorithms (Fomin, Kratsch: *Exact Exponential Algorithms*, Springer 2010)

1. Branching and 3-SAT in $O^*(1.618^n)$ (Ch. 2, 13–23)
2. MIS in $O^*(1.2786^n)$ (Ch. 2, 23–30)
3. Dynamic Programming I (Ch. 3, 31–41)
4. *Dynamic Programming II (Ch. 3, 41–50)
5. Inclusion–Exclusion I (Ch. 4, 51–63)
6. *Inclusion–Exclusion II (Ch. 4, 64–75)
7. Treewidth (Ch. 5)
8. Measure and Conquer I (Ch. 6, 101–113)
9. *Measure and Conquer II (Ch. 6, 113–124)
10. Subset Convolution (Ch. 7)
11. Local Search for SAT (Ch. 8)
12. Split and List / Time vs. Space (Ch. 9/10)