Optimization Algorithms (ACM 41030)

Written Exam

Final version, dated 06/03/2025

The written exam is worth 50% of the module grade. This will take place after the midterm break, at 09:00 (promptly), on **Tuesday 1st April**. The exam will last 50 minutes.

The exam will contain four questions; all four questions must be answered. The exam format is **closed book**. Non-programmable calculators are permitted.

The following is the final list of examinable topics:

- Theorems / Results in Section 1.3 (Convex Sets)
- Results in Section 1.4 (Convex Functions)
- Theorem 2.8 (Convex functions and their minimizer)
- Quadratic Model Problem, Section 2.3
- BFGS formulae, pages 29-31; but NOT Sherman-Morrison-Woodbury
- Theorem 4.2
- Barzilai-Borwein formula, Section 4.3
- Convergence criuterion for Quasi-Newton Methods, Theorem 6.2, Section 6.2
- Cauchy-point calculation, Section 7.6
- Convergence proof, Simulated Annealing, Section 18.4

The following things from the exercises might be asked:

- Exercises #1, including pseudocodes. Note: it will not be required to produce a pseudocode to implement the SWCs. But a pseudocode to implement backtracking linesearch might be asked.
- Exercises #2.
- Exercises #3, *but only Question 1*. The Sherman-Morrison-Woodbury formula would be given – you don't have to memorize this.
- Exercises #4, including pseudocode for the MH and SA algorithms.