Dept. of Computer Science
School of Mathematics
Tel Aviv University
Februay 2000

Complexity

Instructor: Prof. Ron Shamir.

Lectures: Monday 10:30-12:00 Dach auditorium, Thursday 10:30–12:00 Physics 204.

Office hours: Thursdays 17:00-18:00, Schreiber 014.

Teaching assistant: Mr. Dekel Tsur.

Recitations: Wednesdays 11:00-12:00 , 15:00-16:00, 16:00-17:00 Orenstein 110.

TA office hour: Wednesday 14:00-15:00 Schreiber 011.

Problem sets will be handed out weekly in the recitations and are due on the next recitation. Due to shortage of checkers, two students can hand in their solutions together. ***Submitting solutions is not mandatory, but thinking about the problems and solving BY YOURSELF is essential to your success in the course.***

Final grade (for Moed Alef): $\max\{F, .9F+.2P\}$, where F=final exam grade, P=average grade on ALL problem sets. For Moed Bet, the final exam grade will be the final grade.

Course homepage: search http://www.math.tau.ac.il/~shamir/complexity/00/main.html

Course Outline

Introduction.

Computational models: RAM, Turing machine, nondeterministic machines.

Complexity classes; Relations among complexity classes; Savitch's theorem, Immerman's theorem.

Reductions and completeness. Cook's theorem, P-completeness. NP-completeness.

NP-completeness: Basic NP-complete problems and reduction techniques.

Number problems and Strong NP-Completeness. Pseudo-polynomial reductions.

The class Co-NP. Function problems.

Oracle Turing Machines. NP-Hardness.

The Polynomial Hierarchy.

The class PSPACE. PSPACE-completeness.

Dynamic programming.

Approximation: algorithms, schemes, hardness of approximation.

On P vs NP

Efficient enumeration and search methods.

Counting problems and the class #P.

Parallel complexity, PRAM model, the class NC.