Dept. of Computer Science
School of Mathematics
Tel Aviv University
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Complexity

Instructor: Prof. Ron Shamir.

Lectures: Monday 10:30-12:00 Dan David 001, Thursday 10:30–12:00 Dan David 203.

Office hours: Thursdays 17:00-18:00, Schreiber 016.

Teaching assistant: Mr. Dekel Tsur.

Recitations: Wednesdays 11:00-12:00 Orenstein 111, 15:00-16:00, 16:00-17:00 Physics 222.

TA office hour: Wednesdays 12-13, Open Space, Schreiber basement (phone: 8979).

Problem sets will be handed out weekly in the exercise class and are due on the next exercise class. *Submitting solutions is not mandatory, but solving the problems BY YOURSELF is essential to your success in the course.*

Final grade: $\max\{F, .9F + .2P\}$, where F=final exam grade, P=average grade on ALL problem sets.

Course homepage: search http://www.math.tau.ac.il/~shamir/complexity/99/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.