

## ADVANCE COURSE IN DISTRIBUTED COMPUTING

Spring 2012 (Academic year 2011/2012). Prof. Y. Afek (afek at tau.ac...).

Course Home Page [www.cs.tau.ac.il/~afek/dc12.html](http://www.cs.tau.ac.il/~afek/dc12.html)

A graduate course exploring current topics from the literature in distributed computing, focusing on theoretical issues: models, upper and lower bounds, and proof methods. Two major topics:

1. Distributed algorithms for data communication networks (Message Passing)
2. synchronization algorithms for *asynchronous* shared memory parallel machines.

In addition we will discuss the connections and relations between these two models.

### Schedule /\* Subject for Change \*/:

Date	Topic and references used	Additional references
<b>Lecture 1</b>	Models, broadcast and echo [1, 2].	[1, 3, 4, 5, 6, 2].
<b>Lecture 2</b>	Termination Detection, Snapshot [2, 7] Synchronizers [8].	[9, 10, 11, 12, 2], [8, 13].
<b>Lecture 3</b>	Electing a Leader in a Ring Network, Chapter 3 in [?]	[].
<b>Lecture 4</b>	Electing a leader in general graphs [14, 15].	[14, 16, 17, 18, 19, 5, 20, 21, 22, 23].
<b>Lecture 5</b>	Computing the maximal independent set, rings and general graphs, upper and lower bounds [24].	[25, 26, 27, 28, 29].
<b>Lecture 6</b>	Data link protocols, the sequence transmission problem, and End-to-end protocols [30, 31, 32].	[31, 33, 34, 35, 36, 37, 38, 32]
<b>Lecture 7</b>	The Consensus problem. Algorithms and lower bounds [39, 40, 41].	
<b>Lecture 8</b>	The shared memory model [42].	[42, 43, 44, 45]
<b>Lecture 9</b>	The consensus problem, and its impossibility in asynchronous networks with one faulty processor [40] or in the shared memory model [42].	[40, 46, 41, 47, 48, 49].
<b>Lecture 10</b>	Wait-free synchronization, the shared memory hierarchy, and universal constructions [42].	[48, ?, ?]
<b>Lecture 11</b>	Atomic snap-shots of shared memory [50], Immediate snap-shots [51] .	[52]
<b>Lecture 12</b>	Mutual exclusion, Fast Mutual Exclusion, Adaptive Algorithms Taubenfeld Paper Moir Anderson, Lamport-87	
<b>Lecture 13</b>	Simulating Shared memory in message passing, Randomized Consensus.	
<b>Time permitting</b>	Lower bound techniques [53, 24].	[53, 20, 54, 5, 34, 55, 56, 24]

**Grade:** Homeworks 35%, Take home exam 65%.

(This outline will be subject to modification as the semester progresses.)

## References

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