

## *The Hebrew University of Jerusalem*

### *Syllabus*

## **DATA STRUCTURES - 67109**

*Last update 27-09-2018*

HU Credits: 4

Degree/Cycle: 1st degree (Bachelor)

Responsible Department: Computer Sciences

Academic year: 0

Semester: 1st and/or 2nd Semester

Teaching Languages: Hebrew

Campus: E. Safra

Course/Module Coordinator: guy kindler

Coordinator Email: [gkindler@cs.huji.ac.il](mailto:gkindler@cs.huji.ac.il)

Coordinator Office Hours: By appointment only

Teaching Staff:

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Prof Dorit Aharonov  
Ms. Michal Bazir  
Mr. Katzhendler Gal  
Mr. Amichai Holzer  
Mr. Leigh Itai  
Mr. Shiran Guy  
Prof Guy Kindler  
Mr. Nadav Schweiger

Course/Module description:

1. Sorting: insertion-sort, merge-sort and quick-sort. Lower bound for comparison sorting. 2. Asymptotic analysis of running time 3. Recurrence relations, and the divide and conquer paradigm 4. Dynamic data structures 5. Heaps: implementation with an array. Heapsort algorithm 6. Binary Search Trees, AVL trees 7. Huffman Coding 7. Hashing algorithms. 8. Graph algorithms: breadth first search, depth first search (BFS, DFS), minimum spanning tree (MST), strongly connected components (SCC), topological ordering.

Course/Module aims:

See learning outcomes

Learning outcomes - On successful completion of this module, students should be able to:

Learn and understand in-depth some basic algorithms and data structures in Computer Science:  
sorting, graph search, coding schemes, trees, graphs, arrays, heaps.

Analyze existing algorithms and data structures.

Develop new algorithms and data structures

Understand the complexity of computational problems

Attendance requirements(%):

100

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Teaching arrangement and method of instruction: Frontal lectures + exercises

Course/Module Content:

1. Sorting: insertion-sort, merge-sort and quick-sort. Lower bound for comparison sorting. 2. Asymptotic analysis of running time 3. Recurrence relations, and the divide and conquer paradigm 4. Dynamic data structures: 5. Heaps: implementation with an array. Heapsort algorithm 6. Binary Search Trees: AVL trees 7. Hash tables 8. Graph algorithms: breadth first search (BFS), minimum spanning tree (MST) 9. steaming algorithms

Required Reading:

Introduction to Algorithms, Second Edition. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest.

Additional Reading Material:

NA

Course/Module evaluation:

End of year written/oral examination 85 %

Presentation 0 %

Participation in Tutorials 0 %

Project work 0 %

Assignments 15 %

Reports 0 %

Research project 0 %

Quizzes 0 %

Other 0 %

Additional information:

NA