

## CSE 373 Spring 2009

Looking Forward,  
Looking Back

6/05/2009

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## Today's Outline

- **Announcements**

- Final Exam – next Wed June 10<sup>th</sup>, 2:30-4:20
- Office Hours Next week:
  - Mon June 8 - 12:30-1:30pm - Ruth in cse 360
  - Tues June 9 - 11am-12pm - Sean in cse 220
  - Tues June 9 - 2:30pm-3:30pm - Rob in cse 216
  - Tues June 9 - 3:30-4:30pm - Ruth in cse 360
  - Wed June 10 - 11am-12pm - Sean in cse 220

- **Sorting**

- **Review**

- **Course Evaluations**

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## Final Exam

- **Final Exam, Wednesday June 10, 2009.**
- 2:30 - 4:20pm in MGH 241 (Our regular lecture room)
- Exam policies
  - Closed book, closed notes. No Calculators allowed.
  - The exam begins promptly at 2:30pm and ends at 4:20pm.
- The Final exam is cumulative, although a bit more weight will be given to topics covered since the second midterm.

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## More Computer Science Courses!!

- CSE 415 Artificial Intelligence (Fall 2009!)
- CSE 417 Algorithms and Complexity (Winter 2010)
- CSE 410 Computer Systems (Spring 2010)  
(Operating Systems & Architecture)
- CSE 374 Programming Skills/Implementation (Spring 2010)
- CSE 413 Programming Languages  
and their Implementation (later in 2010)

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## Overview and Goals

(From first day handout)

Achieve an understanding of fundamental data structures and algorithms and the tradeoffs between different implementations of these abstractions. Theoretical analysis, implementation, and application. Lists, stacks, queues, heaps, dictionaries, maps, hashing, trees and balanced trees, sets, and graphs. Searching and sorting algorithms.

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## Midterm #1

- Stacks and Queues, array and list implementations.
- Asymptotic analysis, Big-O. Worst case, upper bound, lower bound, analyzing loops, recurrences, amortized complexity.
- Trees – definitions
- Dictionary ADT
- Binary search trees – Inorder, preorder, postorder traversals, insert, delete, find.
- Hashing. Properties of good hash functions. Selecting hash table size. Separate chaining and open addressing. Linear Probing, Quadratic Probing, & Double Hashing to resolve collisions. Rehashing.

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## Midterm #2

- AVL trees - Single and double rotations, insert, find.
- Binary Heaps - Findmin, Deletemin, Insert. Additional operations of increase, decrease, buildheap.
- D-heaps - Findmin, Deletemin, Insert. Additional operations of increase, decrease, buildheap.
- Leftist Heaps and Skew Heaps - Findmin, Deletemin, Insert. Additional operations of merge, increase, decrease
- Disjoint Union/Find. Up-trees. Weighted union (union by size) and path compression.

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## Since Midterm #2

- Graphs. Directed and undirected. Adjacency list and adjacency matrix representations.
  - Topological sorting.
  - Graph searching. Depth-first, breadth-first search.
  - Shortest paths. Dijkstra's algorithm. Greedy Algorithms.
  - Minimum spanning tree, Prim's and Kruskal's algorithms.
- The memory hierarchy. Temporal and spatial locality. Data structure choice and the memory hierarchy.
- B-trees. Motivation, choice of M and L, Insert & delete.
- Sorting. Insertion sort, Selection sort, Heap sort, Merge sort, Quicksort. Lower bound on comparison sorting. In-place sorting. Stable sorting. Bucket sort, Radix sort.

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## Concepts

- ADT – what it is, why we have them, how to compare implementations
- Comparisons – Running time, Space, Big-O, Data Locality
- Tradeoffs – Pointers, Arrays
- Algorithm Design – Iteration, Recursion, Greedy Algorithms, Divide and Conquer

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