

# CSCI 220 OUTLINE

## DATA STRUCTURES I

TEXT: A Practical Introduction to Data Structures and Algorithm Analysis  
2nd Edition Shaffer

**Approved:**

**Effective: FALL 2007**

MATERIAL TO BE COVERED	SECTIONS FROM TEXT	TIME LINE
Data Structures and Algorithm: the need for data structures, costs and benefits, abstract data types, problems vs. algorithms vs. programs, OOP and class templates.	1.1 - 1.3	2.5 Hours
Mathematical Preliminaries: sets and relations, miscellaneous notation, recursion, summations and recurrences, mathematical proof techniques, proof by contradiction and proof by mathematical induction, estimating.	2.1 - 2.7	5 Hours
Algorithm Analysis: best, worst and average cases, asymptotic analysis, upper bounds (big-Oh), lower bounds (big-Omega), and big-Theta, calculating running time, analyzing problems, time vs. space tradeoffs.	6.1 - 3.10	5 Hours
Lists, Stacks and Queues: lists--array-based list implementation, linked lists, header node, comparison of list implementations, doubly linked lists, circular linked lists, the dictionary ADT; stacks--array-based stacks, linked stacks, comparison of array-based and linked stacks, implementing recursion; queues array-based queues, linked queues, comparison of array-based and linked queues.	4.1 - 4.4	10 Hours
Binary Trees: definitions and properties, the binary tree node ADT, binary tree traversals (pre-order, in-order, post-order and level-order), pointer-based node implementations, array implementation for complete binary trees, binary search trees (search, insert and delete), heaps and priority queues, Huffman coding trees and data compression.	5.1 - 5.6	10 Hours
Non-Binary Trees: general tree definitions and terminology, an ADT for general tree nodes, general tree traversals, the parent pointer implementation, general tree implementations (list of children, the left-child/right-sibling, dynamic node and dynamic left-child/right-sibling implementations), K-ary trees, sequential tree implementations.	6.1 - 6.5	5 Hours
Advanced Tree Structures: tries, balance trees (AVL trees and splay trees), spatial data structures -- the K-D tree and the PR quadtree (optional).	13.1 - 13.3	2.5 Hours

\*\*\* 1 Hours = 1 hour of face time. \*\*\*\*This outline allows for 3 hours review and exams.

16 Week Term: 1 week = 2.8333 hours (face time)    6 Week Term: 1 week = 7.5 hours (face time)

Keep in mind that most holidays affect M/W or M/W/F classes, so this timeline -- NOTE the topical outline -- may need adjustment. At least one to three exams plus a comprehensive final will be given during the semester.

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Submitted by: Pop