INSTRUCTOR: Bahman Kalantari, 444 Hill, Tel: (848)445-7297.
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LECTURE: M-W 3:20-4:40 PM, LIV TIL-254
OFFICE HOURS: W 12:00-1:30 PM
Section 1 Recitation: Monday 8:55 - 9:50 AM, LIV BE-250
Section 2 Recitation: Tuesday 10:35 - 11:30 AM, LIV LSH-B115
Section 3 Recitation: Friday 10:35 - 11:30 AM, LIV LSH-B115
Prerequisites: 198:112 Data Structures, 198:206 Introduction to Discrete Structures II
Two Midterms, Final, and Quizzes based on Homeworks
Exams (No Makeup Exams!)
Details will be described in Class Sakai
Grading Guideline: The better of the two scores:
0.15 Quizzes + 0.20 MIDTERM I + 0.20 MIDTERM II + 0.45 FINAL
0.15 Quizzes + 0.25 MIDTERM II + 0.60 FINAL.
TOPICS: The course will cover a large subset of the following topics:
• Methods for expressing and comparing complexity of algorithms: worst and average cases,
lower bounds, and asymptotic analysis.
• Searching, sorting. Lower bounds for comparison-based sorting; binsort and radix sort.
• Divide and conquer. Fast integer multiplication; recurrences; the master theorem; merge-
sort; randomized median and selection algorithms; quicksort; fast matrix multiplication.
• Graph search algorithms. Graphs representations; depth first search; topological search;
strongly connected components. Breadth first search and layered DAGs.
• Greedy algorithms. Spanning trees and cuts, union-find and path compression; minimum
spanning tree (MST) algorithms; randomized algorithms.
• Shortest Paths (SPs) in digraphs. Single-source SPs for nonnegative edge weights; priority
queues and Dijkstra’s; SPs in DAGs; single-source SPs for general edge weights.
• Dynamic programming. Paradigm of SPs in DAGs; longest increasing subsequence; (ap-
proximate) string matching; integer and (0,1) knapsack problems; chain matrix multiplication;
single-pair reliable SPs, all-pairs SPs; independent sets.
• Network flows. Max flow min cut theorem; bipartite matching; Menger’s theorem and
disjoint dipaths. Global minimum cuts.
• Elements of NP-completeness & problem reductions.
• NP-hard problems. Approximation algorithms.
