2017 Fall semester – CS5800 course information

Classes

The following link includes all the details regarding the times and locations.

https://wl11gp.neu.edu/udcprod8/bwckctlg.p_disp_listcrse?term_in=201810&subj_in=CS&crse_in=5800&schd_in=LEC

Grading

Home Work assignments – 15%.
Programming assignment(s) - 10%.
Quizzes – 15% (Best 3 out of 4).
Midterm 1 (Tentative Date Oct 13) – 15%.
Midterm 2 (Tentative Date Nov 17) – 15%.
Final exam (Date TBD) - 30%.

Textbook

Algorithm Design by Kleinberg and Tardos.

Syllabus

The following is a tentative syllabus. It is very likely that we will skip some of the topics. We might also discuss one or two topics that are not mentioned in the table.

Week	Topics	Relevant literature (Algorithm design)
1.	Administrivia Course overview Introduction to algorithms design and analysis Stable matching Asymptotic notation	 2.1 – 2.5
2.	**Divide-and-conquer** Merge sort Recurrence relations Master Theorem	 5.1 5.2
3.	**Divide-and-conquer** Deterministic algorithm for selection Closest Pair	 5.4
4.	**Graph Traversals** Basic definitions and applications Basic traversals Breadth-first search	3.1-3.5
5.	**Graph Traversals II** Depth-first search Topological sorting Strongly connected components	3.1-3.5
6.	**Greedy algorithms**	4.1-4.8

	Activity scheduling Huffman encoding	 4.8
7.	**Minimum spanning trees** Kruskal and Prim's algorithms (greedy)	 4.5-4.6
8.	**Dynamic programming** Longest common subsequence Knapsack	Chapter 6 6.4
9.	**Shortest paths** Shortest paths in DAGs Dijkstra's algorithm Bellman-Ford Floyd-Warshall algorithm	6.8 4.4 6.8
10.	**Flow Networks** Flows and cuts Max-flow min-cut theorem Ford-Fulkerson's algorithm Edmonds–Karp algorithm Applications of network flows Bipartite matching	7.1-7.3 7.5
11.	**Randomized algorithms** Selection: Randomized linear time algorithm Hashing Closest pair	Chapter 13
12.	**Linear programming** Standard forms Formulating problems as linear programs Overview of simplex algorithm	11.6
13.	**NP-completeness** Hard decision problems Polynomial-time reductions P vs NP Cook's Theorem NP-completeness proofs	Chapter 8
14.	**Approximation algorithms** Vertex cover Set cover **Review**	Chapter 11