



## Course Syllabus 2014 / 2015

<b>Course Instructor</b>	Abdallah A. Lafta				
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<b>Title</b>	Algorithm Design and Analysis				
<b>Course Description</b>	Algorithm concept: Analysis and complexity. Design methods, divide and conquer binary search, merge sort, quick sort, selection, matrix multiplication, the greedy method. Dynamic programming: shortest paths, optimal search trees. Backtracking. NP-hard and NP-complete problems.				
<b>Course Objective</b>	<ul style="list-style-type: none"> <li>• Build a solid foundation in algorithms and their applications.</li> <li>• Found the importance of algorithms.</li> </ul>				
<b>Textbook</b>	<ul style="list-style-type: none"> <li>• Introduction to the Design and Analysis of Algorithms, Anany Levitin, 3rd ed., Pearson Education, 2012.</li> </ul>				
<b>References</b>	<ul style="list-style-type: none"> <li>• Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, 3rd ed., The MIT Press, 2009.</li> <li>• Discrete Mathematics for Computer Scientists, Clifford Stein, Robert L. Drysdale, and Kenneth Bogart, 1st ed., Pearson Education, 2011.</li> </ul>				
<b>Course Assessment</b>	Course Student Assessment			Final Exam	
	Tests	Practice	Assignments	Practice	Theoretical
	30%	10%	10%	10%	40%
<b>General Notes</b>	<ul style="list-style-type: none"> <li>• Microsoft Visual Studio 2013 Ultimate Edition used for practice the examples.</li> </ul>				



## Course weekly Outline 2014 / 2015

Week	Date	Topics Covered	Lab.	Assignments
1		Introduction and Course Overview	VS2013	
2		Complexity Computation	Randomize	
3		Analysis of Some Sorting Algorithms	Stopwatch	HW1
4		Best, Worst, and Average Case Analysis	Selection Sort	
5		Order of Growth	Rapid Sort	
6		Asymptotic Notations	Review	HW2
7		EXAM 1	Binary Search	
8		Recursion Algorithm: Factorial, Binary Search	Insertion Sort	
9		Solving Recurrence Relations: iteration	Bubble Sort	
10		Solving Recurrence Relations: Tree, Master Theorem	String Matching	
11		Brute Force: String Matching, Bubble Sort	Review	HW3
12		EXAM 2	GCD	
13		Decrease and Conquer: GCD, Median	Median	
14		Transform and Conquer: Heap Sort	Heap Sort	
15		Divide and Conquer: Merge Sort	Merge Sort	
16		Divide and Conquer: Quick Sort	Review	HW4
17		EXAM 3	Graph DS	
18		Graph Traversal: Depth First Search	DFS	
19		Graph Traversal: Topological Sorting	Topological	
20		The Greedy Approach: Minimum Spanning Trees	Prim's	
21		The Greedy Approach: Breadth First Search	Dijkstra's	
22		The Greedy Approach: Single Source Shortest Path	Review	HW5
23		EXAM 4	SSSP	
24		Dynamic Programming: Longest Common Subsequence		
25		Dynamic Programming: Matrix Chain Multiplication		
26		Dynamic Programming: Knapsack Problem	Review	HW6
27		EXAM 5		
28		Hashing : Analysis, Design	Hashing	
29		Hashing Applications: Database Index	DB Index	
30		Hashing Applications: Cryptography	Review	HW7
31		EXAM 6		
32		NP-Completeness		

*As the instructor for this course, I reserve the right to adjust this schedule in any way that serves the educational needs of the students enrolled in this course.*