

Course Number	CS 330	Course Title	Introduction to the Design and Analysis of Algorithms			
Semester Hours	3	Course Coordinator SP20	Banafsheh Rekadardar			
Catalog Description	A detailed treatment of the design, analysis, and complexity of algorithms, including greedy algorithms, divide and conquer, dynamic programming, and limitations of algorithms as problems get larger or more complex.					
Textbooks						
SP20						
Cormen, T. H. (2009). <i>Introduction to Algorithms</i> . The MIT Press, 3 rd Edition, ISBN: 978-0262033848.						
References						
Course Learning Outcomes						
<ul style="list-style-type: none"> • To understand the advance data structures in-depth. • To learn the basic concepts of algorithm design. • To learn how to determine complexity of algorithms. 						
Assessment of the Contribution to Student Outcomes						
Outcome →	1	2	3	4	5	6
Assessed →		X				X
Prerequisites by Topic						
CS 220 with a grade of C or better.						

Major Topics Covered in the Course

1. Mathematical Foundation: formal treatment of analysis and design of algorithms, growth of functions, summations, recurrences, recursive vs. iterative algorithms, worst case and average case analysis of algorithms, lower bounds {8 classes}
2. Trees: B-Trees and other balanced trees {8 classes}
3. Hashing: hash functions, collisions and resolutions {6 classes}
4. Heaps: implementations, applications, and variations {3 classes}
5. Sorting: variations of quick sort, merge sort, heap sort {4 classes}
6. Graph algorithms: DFS, BFS, topological sort, minimum spanning trees algorithm, and shortest path algorithm {3 classes}
7. Advanced algorithm design techniques: divide and conquer, greedy and backtracking {4 classes}
8. Introduction to parallel algorithms {4 classes}