

Dept Number	CS 330	Course Title	Introduction to the Design and Analysis of Algorithms							
Semester Hours	3	Course Coordinator SP15	Qiang Cheng							
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										
SP17										
<i>Data Structures, Algorithms, and Applications in Java</i> , Anany Levitin, AW Publisher, 3 rd Edition, 2012, ISBN: 9780132316811.										
<i>Introduction to Design & Analysis of Algorithms</i> , Anany Levitin, 3 rd Edition, 2012, ISBN: 9780133001365										
References										
<i>Computer Algorithms: Introduction to Design and Analysis</i> , Baase, Sara. Addison Wesley, 3rd Edition, 2000.										
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	7	8	9	10
Assessed →	X	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}