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Brooklyn College
Department of Computer and Information Science

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CISC 3220 [23] Analysis of Algorithms
3 hours; 3 credits

Algorithms, data structures, and their analysis. Applications for and solution to recurrence problems. Upper and lower bounds on complexities of various problems. Classification by design structures. Sorting methods, graph and selection algorithms. Pattern matching. Efficient computation of transitive closure and equivalences. NP-completeness.

Objectives

Student will be able to:
1. Demonstrate an understanding of the growth of functions, the use of O, Omega and Theta notation, and worst-case and average-case time complexity, and apply the above concepts to analyze the complexity and efficiency of algorithms.
2. Demonstrate knowledge of several algorithms for sorting and order statistics and an understanding of the analysis of their complexities.
3. Demonstrate an understanding of various design techniques such as divide-and-conquer and greedy methods.
4. Demonstrate knowledge of different methods for representing a graph and of basic graph algorithms such as traversals, finding a minimum spanning tree and finding the shortest path.
5. Demonstrate an understanding of the nature of the classes P, NP and NP-complete, and define several problems that belong to these classes.

Textbook

Baase, Sara and Van Gelder. *Computer Algorithms: Introduction to Design and Analysis,* 3rd ed., Addison-Wesley.

Syllabus

Chapter 1:	Analyzing Algorithms
	Sections 1.4, 1.5, 1.6
	(Read section 1.3 – review of mathematical background)
Chapter 4:	Sorting
	Sections 4.1 - 4.9
Chapter 3:	Recurrence Equations and Recursion Trees
	Sections 3.6, 3.7
Chapter 5:	Selection
	Sections 5.1 - 5.5
Chapter 7:	Graphs and Graph Traversals

Bibliography

Aho, Hopcroft and Ullman, *The Design and Analysis of Computer Algorithms,* Addison-Wesley.

Cormen, Leiserson and Rivest, *Introduction to Algorithms, 2nd edition,* McGraw-Hill.

Horowitz and Sahni, *Fundamentals of Computer Algorithms,* Computer Science Press.
Manber, *Introduction to Algorithms: A Creative Approach,* Addison-Wesley.

Langsam, Tenenbaum and Augenstein, *Data Structures Using C++,* Prentice-Hall.