

# Σχεδίαση και Ανάλυση Αλγορίθμων

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## METADATA

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### Abstract

The subject of Algorithms and Data Structures is extremely rich, and many relevant and extremely valuable books have been written in both International and Greek literature. This book is an attempt to collectively capture the material and an experience gathered after many years of research and teaching subjects related to Algorithms and Data Structures, and Graph Theory. The purpose of this synthetic effort is the homogenized recording of a didactic approach that wants to focus particularly on the part of Algorithm Analysis, as it is presented in the corresponding classic books and articles, but also in combination with the analysis of classic Data Structures. The common denominator of the examined objects is an ultimately mechanistic methodology with the aim of solving each specific problem through as many alternative techniques as possible, which are compared and evaluated. This book will be a valuable help for the student trying to understand the concept of Algorithms since it will give a different

look at these topics. The book provides a comprehensive exploration of algorithms, beginning with an introduction that sets the stage for understanding their importance in computing. The background section delves into mathematical foundations essential for algorithm analysis. Fundamental algorithms cover basic concepts and classic problems while algorithmic techniques, such as divide-and-conquer and dynamic programming, are discussed in detail. The book then explores search algorithms and sorting algorithms, offering efficient methods for data organization and retrieval. Amortized and competitive analysis are introduced as different modes of evaluating algorithm performance. Complexity theory is explained to categorize problems based on their computational difficulty. Basic graph algorithms provide solutions for network-related problems, while string algorithms address text processing. The book concludes with a look at randomized algorithms, highlighting probabilistic approaches to problem-solving.

