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## Abstract

This book includes material that goes beyond a typical "Discrete Mathematics" course usually taken by Computer Science students. It begins with basic concepts of Set Theory and Logic, at a level that facilitates their later use in the course, without focusing on difficult theorems (though the diagonal argument is discussed for countability and computability). It then covers fundamental Number Theory concepts such as divisibility, prime factorization, the Euclidean algorithm, and modular arithmetic. The first major section focuses on enumeration techniques in Combinatorics, followed

by core Graph Theory topics like degrees, connectivity, coloring, bipartite graphs, matchings and duality, trees, and basic algorithms. After combinatorics, it introduces discrete probability, random variables, and expected values, which support applications to non-probabilistic and algorithmic problems. Additional material includes formal language theory: regular languages, deterministic and non-deterministic automata, and automata algorithms. This extra content lies beyond the core Discrete Mathematics course and is used depending on teaching needs and available time.







