Discrete Mathematics

Course # DMNS 2012

Credits 6

Course Description

Discrete Mathematics for Computer Science is an introductory course designed to provide a foundational understanding of the mathematical concepts and techniques used in computer science. The course covers sets, relations, functions, and other fundamental mathematical concepts used in computer science, such as logical reasoning, induction, recursion, counting, graphs, and trees. This course also covers the applications of concepts in computer science such as algorithms, their reliability and complexity.

Course Learning Outcomes

Upon the completion of this course, students will:

- Describe the fundamental concepts of propositional logic.
- Construct truth tables for compound propositions
- Analyze the precedence of logical operators.
- Apply propositional logic to solve logic puzzles and system specifications.
- Differentiate between predicates and quantifiers, including the universal, existential, and uniqueness quantifiers.
- Translate English statements using propositional logic and predicate logic.
- Identify and manipulate sets, relations, and functions including operations with sets and properties of functions using appropriate mathematical notation.
- Evaluate the properties of various algorithms, including searching, sorting, and greedy algorithms, and compare their efficiency and complexity in different contexts.
- Apply mathematical proof techniques, such as mathematical induction and strong induction, to validate statements and solve problems involving sequences, summations, and recurrence relations.
- Solve advanced counting problems using techniques like the pigeonhole principle, permutations, combinations, and binomial coefficients, and apply these methods to complex scenarios.
- Model problems using graphs and trees.
- Analyze graph structures, including different types of graphs, connectivity, Euler and Hamilton paths.

Course Assessments and Grading

Item	Weight
Homework	10%
Quizzes	20%
Class Participation	10%
Midterm Exam	30%
Final Exam	30%