NATIONAL UNIVERSITY
of Computer & Emerging Sciences, Lahore

Department of Computer Science

CS 1005– Discrete Structures

Fall 2024

Program: BSCS / BDS/SE **Credit Hours:** 3 **Type:** Core

Course Moderator:

Course Description/Objectives/Goals:

The goal of this course is to introduce the students to "Discrete Mathematics", which is an important area of mathematics and theoretical computer science. It deals with structures that are not continuous and do not vary smoothly, but are distinct with separate values. The course covers the basics of logic, set theory, proof techniques, counting, number theory and graph theory.

Course Learning Outcomes (CLOs):		
At the end of the course students will be able to:	**Domain**	**BT* Level**
1. Understand the key concepts of Discrete Structures such as Sets, Permutations, Combinations , Relations, Graphs, etc.	C	2
2. Apply formal logic proofs and/or informal, but rigorous, logical reasoning.	C	3
3. Apply discrete structures into computing problems.	C	3
4. Differentiate various discrete structures.	C	4
* BT= Bloom's Taxonomy, C=Cognitive domain, P=Psychomotor domain, A= Affective domain. **Bloom's taxonomy Levels:**1. Knowledge, 2. Comprehension, 3. Application, 4. Analysis, 5. Synthesis, 6. Evaluation		

Course Textbook

1. Kenneth H. Rosen, Discrete Mathematics and Its Applications, seventh Edition., McGraw-Hill.

Additional references and books related to the course:

1. Ralph P. Grimaldi, *Discrete and Combinatorial Mathematics: An Applied Introduction*, Fourth edition or later, Addison-Wesley.
2. Winifred K. Grassman, Jean P. Tremblay, *Logic and Discrete Mathematics: A Computer Science Perspective,* International Edition (or edition 1 or later), Prentice Hall.
3. Stuart Russell and Peter Norvig, *Artificial Intelligence, A Modern Approach*, Second edition or later, Pearson.

Tentative Weekly Schedule

Week	Topics to be covered	Section/chapter
1	Introduction to the course Propositional Logic Applications of Propositional Logic	1.1 and 1.2
2	Propositional Equivalences Predicates and Quantifiers	1.3 and 1.4
3	Nested Quantifiers Rules of Inference	1.5 and 1.6
4	Introduction to Proofs Proof Methods and Strategy	1.7 and 1.8
5	Cardinality of sets. countable and uncountable sets	2.5
6	Midterm Exam 1	
6	Divisibility and Modular Arithmetic Primes and Greatest Common Divisors	4.1 4.3
7	Solving Congruences Mathematical Induction	4.4 5.1
8	Strong Induction The Basics of Counting	5.2 6.1
9	The Pigeonhole Principle Permutations and Combinations Binomial Coefficients and Identities	6.2 , 6.3 and 6.4
10	Generalized Permutations and Combinations Applications of Recurrence Relations	6.5 and 8.1
11	Solving Linear Recurrence Relations and Their Properties	8.2 and 9.1
11	Mid term 2	
12	Representing Relations Closures of Relations	9.3, 9.4
13	Equivalence Relations Graphs and Graph Models	9.5 and 10.1
14	Graph Terminology and Special Types of Graphs Representing Graphs and Graph Isomorphism	10.2 and 10.3

Evaluations

1. Assignments: 10%
2. Quizzes: 10%
3. Midterm Exams:30%
4. Final Exam: 50%

Course Policies

1. No makeup for missed quizzes or assignments.
2. 80% attendance is essential

Grading Scheme

Absolute