NATIONAL UNIVERSITY
of Computer & Emerging Sciences, Lahore

Department of Computer Science

CS 1005– Discrete Structures

FALL 2023

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

Course Moderator: Dr. Saeeda Zia

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	Readings	Assignments/Projects?

1	Introduction to discrete structures		
2	Propositional calculus, logical connectives and examples		
3	Propositional calculus continued, inference techniques		
4	First order logic: predicates and quantifiers, inference techniques		
5	Set theory: set operations, set relationships, Functions, classification and composition.		
6	Midterm Exam 1		
6	Cardinality of sets. countable and uncountable sets		
7	Binary and n-ary Relations, representing Relations, closure, equivalence		
8	Proof techniques		
9	Proof techniques continued + Mathematical induction with examples		
10	Number theory: Euclidean algorithm, LCM, Fermat's little theorem, Chinese remainder theorem, modular exponentiation.		
11	Recurrence relation, homogenous and non-homogenous equations		
12	Midterm 2		
12	Introduction to counting, permutations, combinations, pigeon hole principle		
13	Combinatorics: Pascal's Triangle, pascal's identity, Vandermonde identity		
14	Introduction to graphs		
15	Problems related to graphs		

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