Institute of Computer Science/Information Technology (ICS&IT)
Faculty of Management Sciences & Computer Sciences (FMCS)
The University of Agricultural Peshawar

Program: BS (CS+IT)-2
Course Name: Discrete Structures
Course Code: GE-312
Course Hours: 03
Total Week: 16
Total Hours: 48

Course Objectives

A major purpose of the course is to present material in a precise. Readable manner with the concepts and techniques of discrete objects — Objects consisting of distinct or unconnected elements. Thought this course the students will develop mathematical maturity; it will develop their ability to understand and create mathematical arguments. Students will learn particular set of mathematical facts and how to apply them. To achieve these goals five important themes are interwoven in the course i.e. mathematical reasoning combinatorial analysis discrete structure algorithmic thinking and application/modeling.

Week-1

- Introduction: Objectives of the course.
- Logic
- Propositional Logic

Week-2

- Logical connectives
- Translation of English sentences

Week-3

- Propositional equivalence
- Valid and Invalid Arguments, Application

Week-3 & 4

- Algorithms
- Complexity of algorithms
- Division algorithm
- Applications to number theory
- Matrices

Week-6

- Sequences
- Summations

Week-7 & 8

- Methods of proof
- Recursive definition
- Recursive algorithm
- Program correctness

Week-9

- Relations and their properties
- n-ary relations
- Representing relations

Week-10

- Closure of relations
- Equivalence relations
- Partial orderings

Week-11 & 12

- Graph terminology
- Graph representations and isomorphisms
- Connectivity
- Euler and Hamilton paths
- Shortest Path Problems (optional)
- Planar graphs
- Graph coloring (optional)

Week-13

- Basics of Counting:
- Counting arguments
- Addition principle
- Multiplication principle

Week-14

- Permutations
- Combinations

Week-15

- Cardinality and countability
- Probabilistic methods.

Week-16

-Pigeonhole Principle

Total Marks: 100

Recommended Books

1. 1. Kenneth H. Rosen, *Discrete Mathematics and Its Applications*, 6TH edition, 2006, Mcgraw Hill Book Co.
2. Richard Johnsonbaugh, *Discrete Mathematics,* 7TH edition, 2008, Prentice Hall Publishers.
3. Kolman, Busby & Ross, *Discrete Mathematical Structures*, 4th edition, 2000, Prentice-Hall Publishers.
4. Ralph P. Grimaldi, *Discrete and Combinatorial Mathematics: An Applied Introduction*, Addison-Wesley Pub. Co., 1985.