

Data Structures & Algorithms – Fall 2015

(BS-SE-F14 Morning & Afternoon)

Course code	CMP-210
Credit hours	3
Prerequisite	Object-Oriented Programming (CMP-142)
Course Instructor	Muhammad Ahmad Ghazali Email: ahmad.ghazali@pucit.edu.pk Office hours: TBA

Course Objectives

- To introduce data structures as basic building blocks of large programs.
- To learn the commonly used data structures.
- To introduce the notion of time and space complexity.
- To develop the skills to analyze time and space requirements for a data structure and associated algorithms.
- To prepare the students to pick the right data structure for a given problem.

Textbook

- E. Horowitz, S. Sahni, and D. Mehta, *Fundamentals of Data Structures in C++*, Computer Science Press, 1995.

Reference Books

- A. Drozdek, *Data Structures and Algorithms in C++*, 3rd Edition, Course Technology, 2005.
- L. Nyhoff, *ADTs, Data Structures, and Problem Solving with C++*, 2nd Edition, Prentice Hall, 2005.
- M.A. Weiss, *Data Structures and Algorithm Analysis in C++*, 3rd Edition, Addison-Wesley, 2007.
- N. Dale, *C++ Plus Data Structures*, 3rd Edition, Jones and Bartlett, 2003.

Grading Scheme

Quizzes	4-6	16%
Assignments	2-3	6%
Homeworks	4-6	3%
Midterm	1	35%
Final	1	40%

Passing Criteria

- Minimum requirement to pass this course is to get overall 50% marks.

Tentative Course Outline and Lecture Plan

Topics	No. of Lectures
Introduction	1
List ADT: Unsorted and Sorted	1
Performance analysis and measurement, Time and space complexity	2
Searching – Linear search, Binary search, and their analysis	1
Sorting – Bubble sort, Selection sort, Insertion sort	1
Stacks using arrays, Evaluation of Expressions	2
Queues using arrays	1
Recursion, Linear search, Binary search, Merge sort, Quick sort	4
Linked lists – Motivation and Implementation of Singly-linked lists	1
MIDTERM EXAM	
Stacks and Queues using Linked lists, Recursion on Linked lists	1
Circular and Doubly-Linked lists	1
Trees – Binary Trees and Traversals	2
Binary Search Trees – Insertion, Deletion, Searching	2
Heap and Priority Queue, Heap sort	2
Height Balanced Trees (AVL Trees or 2-3 Trees)	2
Hashing	2
Graphs – Representation, Traversals (DFS & BFS), Minimum spanning trees	2
FINAL EXAM	

Important Notes

- **Academic integrity is expected of all students. Plagiarism or cheating in any assessment will result in at least an “F” grade in the course, and possibly more severe penalties.**
- **You bear all the responsibility for protecting your assignments from plagiarism. If anyone else submits your assignment or uses your code in his/her assignment, you will be considered equally responsible and will be punished equally.**
- The instructor reserves the right to modify the grading scheme/marks division and course outline during the semester.
- Knowledge of C++ and object-oriented paradigm is assumed for this course. All code written in quizzes, assignments, homeworks, and exams **MUST** be in C++. Code must be intelligently commented. Uncommented code may not be given any credit.
- You are required to use Microsoft Visual Studio for writing your code.
- All quizzes will be announced. There is NO makeup for a missed quiz, assignment, or homework.