Course Outline

Data Structures CS
Semester Fall-2023

Instructor: Arooj Khalil
Day: Monday and Wednesday
Office timings: Tuesday and Friday: 1 pm to 4 pm
Email: arooj.khalil@nu.edu.pk

Course Objectives:

Data Structures is a core Software Engineering course with Computer Programming as its prerequisite.

The objectives of this course are:

- Introduce students to data structures and their associated algorithms • Introduce the concept of efficient data structures and how this efficiency can be measured
- Prepare students to select appropriate data structures for a given computational problem.

COURSE OUTLINE

Lectures	Topics
1	Introduction to Data Structures Abstract data Types vs Data Structures
2	Time complexity Analysis and asymptotic Bounds
5	Abstract Data Type: LIST • Array based List – Sorted and Unsorted • List using Linked List – Sorted and Unsorted • Doubly Linked List • Circular Linked List
2	Abstract Data Type: STACK • Array Based Stack • Implementing a Stack as a Linked Structure Use of Stack – Evaluating Expression Using Stack
	MID TERM 1
2	Abstract Data Type: QUEUE • Array Based Queue • Implementing a Queue as a Linked Structure
2	Recursion • Recursion, Recursive Solution • Recursive and non-recursive implementation
3	Abstract Data Type: TREE • Binary Search Tree • Tree Traversal Methods • Binary Search Tree Operations Application of trees to solve different problems
3	Balanced Tree (AVL)
	MID TERM 2

2	HEAP • Heap Data Structure • The Use of Heap in Priority Queue
3	HASHING • Hash tables • Hash Methods • Handling Collision • Universal Hashing
3	Abstract Data Type: GRAPH

	• Graph Representations • Graph Data Structure Depth-First and Breadth-First Search

Text Book:

Any one of these books is recommended as a text book:

• Data-Structure Using C++, DS Malik.

• Adam Drozdek, *Data structures and algorithms in C++*, Course technology, 2004. • Nell Dale, *C++ Plus Data Structures*, 3rd Edition, Jones and Bartlett, 2003. • Michael T. Goodrich, Roberto Tamassia and David M. Mount, Data structures and algorithms, 2nd Edition, John Wiley & Sons, 2011.

• Mark Allen Weiss, *Data structures and algorithm analysis*, Pearson Education, 2007.

Tentative Grading Scheme:

Assignments **(15 %)**
Quizzes **(15 %)**
Midterms **(30 %)**
Final Exam **(40 %)**

Important Instructions:

- Quizzes may be announced or surprised.
- There will be no make-up quiz.
- The minimum requirement to pass this course is to obtain at least 50% marks. o All assignments and coursework must be done individually. **Plagiarism** in any work (Quiz, Assignment, Midterms, and Final Exam) from any source (Internet or a Student) will result in an **F** grade.
- No Late Assignment Submissions
- All the CS department's grading policies apply.