

Course Outline

Data Structures CS-2001

Semester Fall-2025

Instructor: Rana Waqas Ali

Email: rana.waqasali@nu.edu.pk

Credit 3+1

Hours:

Office Hours: Tuesday and Thursday
1:00-2:30 p.m.

Prerequisite Object Oriented
Programming

Program Learning Outcomes (PLOs)

This course covers the following PLOs:

PLO#	PLO Name	PLO Description
PLO 2	Knowledge for Solving Computing Problems	Apply knowledge of computing fundamentals, knowledge of a computing specialization, and mathematics, science, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements
PLO 3	Problem Analysis	Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines
PLO 4	Design/ Development of Solutions	Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations

Course Learning Outcomes (CLOs)

CS2001 is a core Computer Science course with Object Oriented Programming as its prerequisite. The course learning outcomes of this course are:

CLO #	CLO Description	BT Level	PLO#
CLO1	Demonstrate basic concepts of data structure and algorithms.	3	PLO2
CLO2	Evaluate different data structures in terms of memory complexity and time.	5	PLO3
CLO3	Design appropriate data structures to solve real world problems related to the program.	6	PLO4
CLO4	Determine bugs in programs and recognize required operations with data structures.	1	PLO3

Text Book:

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

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

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LECTURES	TOPICS
1	Introduction
2	Time Complexity Analysis and Asymptotic Bounds
5	Linked Lists Review of pointers Singly linked lists, doubly linked lists, circular lists and corresponding iterators
2	Stacks and Queues
MIDTERM 1	
2	Recursion
3	Trees Binary trees and their traversals Binary search trees (Insertion, Deletion and Search)
3	Height Balanced Binary Search Trees (AVL Trees)
2	Heaps and heap sort
MIDTERM 2	
1	Data compression and Huffman coding
2	Hashing Hash tables and hash functions Collision resolution
3	Graph data structure, Breadth first search and Depth first search
2	Advanced Topics

Tentative Grading Scheme:

Assignments(10 %)

Quizzes(10 %)

Midterms(30 %)

Final Exam (50 %)

Homework(0%)

Important Instructions:

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