CS201- Data Structures
Pre-requisite: CS104 Computer Programming
Credits Hours: 3
Instructor: Muhammad Rafi/ Nida Pervaiz
TAs:

Course Description

Data Structures is a core course in Computer Science curriculum. It is an essential building block for solving applied problems with computers. The course will introduce the fundamentals of data structures and will provide thorough understanding of how to systematically organize data inside a computer system. The course discusses basic memory management for efficiently solving problems on both time and space requirements. A variety of data structures will be discussed theoretically, their efficient implementations and application cases will also be discussed. The student will learn abstraction, encapsulation and structures for efficiently processing information in a variety of scenarios.

Course Objectives

1. To understand the design of fundamental data structures and algorithms for problem solving through computer system.
2. To study the tradeoff choices in the design and implementation of data structures
3. To provide a rigorous "hands-on" experience with implementing different data structures in a high-level programming language
4. To analyze time/space tradeoff for different solutions to the same problem.

Learning Outcomes

1. Student will be able to learn and understand basic/advanced data structures
2. Student will be able to perform analysis of data structures choices for any real-world application.
3. Student will learn the tradeoff with different choices of data structures
4. Student will be able to write computer solutions for efficiently store, retrieve manipulate and update the data stored inside computers.

Grading Scheme

Programming Assignments	20%
Quizzes	10%
Midterm Exam	15%
Final Exam	40%
Class Project	10%
Class Participation	05%

Programming Assignments

There will be 3 programming assignments for the course. The programming assignments will be on slate and you need to program and submit these at the same website. You only required to submit the code file. It is an individual activity and hence No plagiarism is acceptable in these submission.

Quizzes

There will be n quizzes and the best n-1 will be counted towards grading. All will be surprised.

Textbook and References

Data Structures and Algorithms in C++ 4th Edition- by Adam Drozdek

Class Projects

A class project is included into the grading scheme. The project is related to Text Oriented Processing(TOP) domain using the data structures.

Class Participation

Everyone in the class need to communicate and participate. You need to make yourself recognize for the course.

CS201- Data Structures – Fall 2019

Session	Topics	Chapters
1	Course Overview, Introduction to Course & Conduct, Grading Scheme, Text Book, Quizzes, Assignments	
2	C++ Language Specification & OOP	Chapter 1
3	C++ Language Specification & OOP	
4	C++ Language Specification & OOP	
5	C++ Dynamic Memory Management	
6	Arrays (1D) – Dynamic Safe Arrays	
7	Arrays (2D)	
8	Different Type of Arrays	
9	Recursion - 1	Chapter 5
10	Recursion - 2	
11	Recursion - 3	
12	List (Singly Linked List)	Chapter 3
13	List (Doubly Linked List)	
14	List (Circular Linked List)	
15	Elementary Sorting Techniques -1	Chapter 9
16	Elementary Sorting Techniques -2	
17	Searching	
18	Stack -1	Chapter 4
19	Stack - 2	
20	Stack – application	
21	Queues + Priority Queues	
22	Queue Application	
23	Heap	
24	Advanced Sorting - 1	Chapter 9
25	Advanced Sorting - 2	
26	Trees – BT, BST, MWT-- 1	Chapter 6-7
27	Trees – BT, BST, MWT-- 2	
28	Trees – BT, BST, MWT-- 3	
29	Trees – BT, BST, MWT-- 4	
30	Hashing - 1	Chapter 10
31	Hashing - 2	
32	Graphs - 1	Chapter 8
33	Graphs Traversals- 1	
34	Graphs Traversals- 2	
35	Weighted Graphs	
36	Graph Algorithms	
37	Revision & Application	
38	Revision & Application	
39	Revision & Application	