Ahsanullah University of Science and Technology
Department of Computer Science and Engineering (CSE)

Course Outline

Course No	**:** CSE2104
Course Title	**:** Data Structures Lab
Credit Hour	**:** 1.5
Semester (Session)	**:** Fall 2020
Student Year & Student Semester	**:** 2nd Year, 1st Semester
Course Teacher(s)	**:** Mr. Emam Hossain, Assistant Professor Ms. Nowshin Nawar Arony, Lecturer Mr. Anik Chowdhury, Adjunct Lecturer

Course Objective:

Data Structure is a specialized way of organizing and storing data. Different kinds of data structures are suited to different kinds of application. The main objective of this lab course is to implement various types of data structures in different types of programming problems. This lab is designed to teach students the fundamental data structures and the algorithms used to manipulate them. Students will gain practical knowledge by writing and executing programs in C/**C++**/Java using various data structures such as arrays, linked lists, stacks, queues, trees, graphs, hash tables and search trees. At the end of this course the students should have a basic understanding of these important data structures and they should be familiar enough with the concepts that they can make use this knowledge in solving problems.

This lab complements the *Data Structures (CSE2103)* course.

Preferred Programming Language: C / **C++** / Java.

Preferred IDE: Code Blocks

Text/Reference books:

- "Data Structures" written by "Edward M. Reingold, Wilfred J. Hansen". Publisher: Addison Wesley School, 1998.
- "Schaum's outline of theory and problems of data structures" written by "Seymour Lipschutz". Publisher: McGraw-Hill, 1986.

Session Plan:

Week	Topics/Contents
01	***Introduction to Data Structure*** Data Structure definition, Different types of data structure, Use of data structures in problem solving, Bubble sort, Linear search.
02	***One-dimensional Arrays*** Selection sort, Insertion sort, Binary search.
03	***One-dimensional Arrays*** Quick sort & Merge sort.
04	***Pointer, Structure and Linked List*** Basic concept of pointer, Structure definition. Introduction to Linked List, Creating and Traversing list, Linked List operation (Insert node in different positions, Delete node from different positions).
05	***Stack and Queue*** Stack and queue using Array.
06	***Linked List*** Doubly and Circular Linked List.
07	***Stack and Queue*** Stack and queue using Linked List. ***Mid-Term test*** Mid-term test will be held based on the topics covered up to 6th week.
08	***Tower-of-Hanoi problem + Infix-Postfix Notation*** Tower-of-Hanoi implementation in recursive & non-recursive way. Infix to Postfix Conversion, Postfix Evaluation.
09	***Graphs & Trees Basic*** Graph and their application, Different types of graphs, Graph representation, General Tree concept
10	***Graphs*** Traversing a Graph, BFS, DFS.
11	***Trees*** Binary tree, Tree construction, Tree operations and Traversal
12	***Binary Search Tree(BST)*** Inserting, deleting and searching in BST.
13	***Hashing*** Hash functions and collision resolutions. ***Term Final*** Term final test will be held based on the topics covered from 7th to12th week.
14	***Packed Word*** Packing and unpacking.

Note: *This Session Plan is subject to change. Course teacher will slow down or speed up each chapter to meet the needs of students.*

Marks Distribution:

Evaluation Criteria	Evaluation Phase – I (Before Mid)		Evaluation Phase – II (After Mid)	
	Evaluation Week	Allocated Marks	Evaluation Week	Allocated Marks
Home Assignment/ Offline	3,4,5,6,7	5%	9,10,11,12,13	5%
Class Assignment/ Online	2,3,4,5,6	15%	8,9,10,11,12	15%
Mid Exam/ Final Exam	7	20%	13	20%
Attendance and Class Performance	1-7	10%	8-14	10%
Sub Total		50%		50%

In each lab class, some related programming problems will be given to the students that should be solved in the lab. Again, some problems will be given on the same topic as individual assignments that will be checked in the next lab class.

Some Useful Resources:

1. "Computer Programming 2nd Part" written by "Tamim Shahriar Subeen". Publisher: Dimik Prokashoni, 2016. Rokomari Link
2. "Computer Programming Part 3 Introduction to Data Structure & Algorithm" written by "Tamim Shahriar Subeen". Publisher: Dimik Prokashoni, 2018. Rokomari Link
3. "Graph Algorithm" written by "Shafaet Ashraf". Publisher: Dimik Prokashoni, 2016. Rokomari Link (An alternative for this book is Shafaets Blog)
4. For practicing Data Structures: geeksforgeeks
5. For visualizing different algorithms https://visualgo.net/en
6. Youtube playlists
    a. "Data structures and Algorithms in Bangla" by "Tamim Shahriar". Link: https://bit.ly/2J0vbsL (An alternative for Resource 2)
    b. "Data structures" by "mycodeschool". Link: https://bit.ly/1ElhMUl
    c. "Pointers in C/C++" by "mycodeschool". Link: https://bit.ly/2ElJmaO (**must watch**)
7. For revising C/C++ with exercises use this link.