



NORTH SOUTH UNIVERSITY Department of Electrical and Computer Engineering

Course Outline
CSE 225: Data Structures and Algorithms

FALL 2021

Course Information

Course: CSE 225 Data Structures and Algorithms
Credit Hours: 3

Prerequisite: CSE 215 Programming Language II

Faculty Information

Name: Dr. Mohammad Rezwanul Huq
Associate Professor (Part-time) (MRH1)

Office: SAC 1182
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Class Time: Theory – MW 09:40-11:10 Lab – MW 01:00 – 02:30 (Section 10)

Class Room: Theory – SAC 308 Lab – LIB 604 (Section 10)

Counselling Hour: appointment basis

Course Summary

This course is about an introduction to the theory and practice of data structuring techniques. Topics include internal data representation, abstract data types (ADT), stacks, queues, list structures, recursive data structures, trees, graphs, and networks. The concept of object orientation as a data abstraction technique will be introduced.

Course Objectives

The objectives of this course are to

- Introduce the basic data structures for storage and retrieval of ordered or unordered data using arrays, linked lists, binary trees, heaps, graphs, and hash tables.
- Introduce the concept of problem domain analysis and exploit the domain features to improve data structure efficiency.
- Develop the concept of asymptotic analysis using Big-O techniques to compare different algorithmic solutions.

Course Outcomes (COs)

Upon successful completion of this course, students will be able to:

CO1	Understand and apply ordered lists for developing effective problem solutions.
CO2	Interpret and apply different trees for manipulating hierarchical data.
CO3	Interpret and apply graphs and hashing techniques for solving computational problems.
CO4	Compute the efficiency of data structures for complex problem-solving algorithms;
CO5	Perform and demonstrate the acquired knowledge; support as a team member to develop applications as a project team;

Course Content & Tentative Teaching Schedule

Week	Lecture Topic(s)	Teaching Material and References
1	Data Types, Pointer, Structure, Class, Dynamic Memory Allocation, and Abstract Data Types (ADTs)	Will be uploaded in course repository
2	List ADT: Singly and doubly Linked list Implementation and Basic operations with Application	Will be uploaded in course repository
3	Stack ADT: Basic operations on Stack, Implementation of Stack and its Applications	Will be uploaded in course repository
4	Queue ADT: Basic operations on Queue, Implementation of Queue and its Applications	Will be uploaded in course repository
5	Iterative Solution and Recursive Solution design	Will be uploaded in course repository
6	Basic Tree Concepts, Tree Traversals, Binary Trees and their applications	Will be uploaded in course repository
	MID TERM ASSESSMENT	
7	Binary Search Trees - Insert, Delete, Search, and Traversal Algorithms	Will be uploaded in course repository
8	Balanced Binary Search Trees – AVL Tree, Red-black Tree	Will be uploaded in course repository
9	Binary Heap implementation and its application, Priority queue	Will be uploaded in course repository
10	Graph representation, Terminology, Graph creation, traversal techniques	Will be uploaded in course repository
11	Spanning Tree, MST, Shortest Path Problem	Will be uploaded in course repository
12	Hashing: Hash table generation, Collision resolution	Will be uploaded in course repository
	FINAL ASSESSMENT	

Teaching Materials/Equipment

Textbook

- Gilberg, Richard, and BehrouzForouzan. *Data Structures: A pseudocode approach with C*, 2nd Edition, Publisher: Nelson Education, 2004.
- Mark Allen Weiss, *Data Structures and Algorithms Analysis in C++*, 4th edition, Pearson, 2014.

References

- Aho, Alfred V., and Jeffrey D. Ullman. Data structures and algorithms. Publisher: Pearson, 1983
- Cormen, Thomas H., Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein. Introduction to algorithms. Publisher: MIT Press, 2009

Lab Manual:

Lab manuals will be provided.

Project Description:

A project description for each group will be provided.

Equipment/Software:

Any C/C++ IDE: As example, Visual C++, CLion, Code::Blocks, and/or Dev-C++

Course Repository:

https://drive.google.com/drive/folders/1FVZhS1W7-hFgcQBFtKWIQ0Sj_pDPA-yr?usp=sharing

Assessment Weightage (Evaluation and Grading Policy)

The relative contributions of exams, lab work, and reports are as follows:

Theory Part	
Attendance and Class Participation	5%
Class Tests (best two of four)	15%
Mid Term Assessment	15%
Final Assessment	25%
Coding Assignment	5%
Project Presentation	15%
Overall Lab Performance	20%

Grading System

Marks (%)	Letter Grade	Grade Point	Marks (%)	Letter Grade	Grade Point
93-100	A Excellent	4.00	73-76	C Average	2.00
90-92	A-	3.70	70-72	C-	1.70
87-89	B+	3.30	67-69	D+	1.30
83-86	B Good	3.00	60-66	D Poor	1.00
80-82	B-	2.70	Below 60	F	0.00
77-79	C+	2.30			

The exact cut-off points for assigning letter grades are at the discretion of the individual instructor. The same applies to the assignment of + or - after a letter grade. It is meant to give more flexibility so that shades of performance can be distinguished and rewarded. The + and - has a value of 0.3 grade point. (Source: <http://www.northsouth.edu/academic/grading-policy.html>)

Exam Dates

Exam	Section 10
Mid Term Exam	29 November 2021
Final Exam	As per the schedule of the university

Academic Code of Conduct

Academic Integrity

Any form of cheating, plagiarism, personation, falsification of a document, and any other form of dishonest behavior related to obtaining academic gain or the avoidance of evaluative exercises committed by a student is an academic offense under the Academic Code of Conduct. **It may lead to severe penalties up to and including suspension and expulsion.**

Special Instructions

- Students **MUST WEAR** dresses in conformity with the **dress code of NSU** within the lecture/lab classes and examination hall.
- Students are expected to attend all classes, labs, and examinations.
- Students will not be allowed to enter into the classroom after 15 minutes of the starting time.
- For plagiarism, the grade will automatically become zero for that exam/assignment.
- There will be **NO make-up examinations**. In case of emergency, you MUST inform me within 48 hours of the exam time. Failure to do so will mean that you are trying to take UNFAIR advantage, and you will be automatically disqualified. A proper medical certificate (if applicable) must be presented in the next class you attend.
- All mobile phones **MUST** be turned to silent mode during class, lab, and exam periods.
- Please keep all of your quizzes, assignments, and exam papers until the end of the semester as proof in case of any grading discrepancy.
- There is **zero tolerance for cheating**. Students caught with cheat sheets in their possession, whether used or not used and/or copying from cheat sheets, writing on the palm, back of calculators, chairs or nearby walls, etc., would be treated as cheating in the exam hall.

Special Instructions for Online Classes

- Don't be late to join the class.
- Please mute your mic during the class.
- If you have any questions, raise your hand electronically or speak up when the instructor allows you to do so.
- Switch on your camera during attendance registration. Otherwise, your attendance will not be counted.
- **During online assessments, maintain your academic honesty and integrity. If any part of your answer seems to be copied from other students or the internet, you will be heavily penalized.**