COURSE OUTLINE

Course Code: CSE 204

Course Title: Data Structures and Algorithms I Sessional

Level/Term: 2/1 **Section: All**

Academic Session: July 2021

Course Teacher:

Name:	Office/Room:	E-mail and Telephone:
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Course Outline:

Internal data representation; Abstract data types; Introduction to algorithms; Asymptotic analysis: growth of functions, O, Ω and Θ notations; Correctness proof and techniques for analysis of algorithms; Master Theorem; Elementary data structures: arrays, linked lists, stacks, queues, trees and tree traversals, graphs and graph representations, heaps, binary search trees; Graph Traversals: DFS, BFS, Applications of DFS and BFS; Sorting: heap sort, merge sort, quick sort; Data structures for set operations; Methods for the design of efficient algorithms: divide and conquer, greedy methods, dynamic programming.

Objectives:

i. Demonstrate a familiarity with major data structures.

ii. Analyze the asymptotic performance of different algorithms.

iii. Apply important algorithmic design paradigms and methods of analysis.

iv. Assess how the choice of data structures and algorithm design methods impacts the performance of programs.

v. Choose the appropriate data structure and algorithm design method for solving different real-life problems.

Learning Outcomes:

After undergoing this course, students should be able to

i. understand algorithmic behavior in terms of time and space
ii. understand average case, worst case, best case behavior of algorithms
iii. design, analyze, and implement basic data structures such as arrays, lists, stacks, queues, trees, and graphs
iv. design, analyze, and implement some advanced data structures such as heaps
v. assess data structure impacts on the performance of an application
vi. compare between several data structures and choose the best one for specific application
vii. learn basic graph algorithms and their applications viii.learn sorting algorithms
viii. formulate problems and solve them using greedy method, divide and conquer, dynamic programming

Assessment:

Homework Assignments with Viva: 50-60%

Online Assignments: 20-30%

Quiz/Final Online : 20-30%

Text and Reference Books:

i. Introduction to Algorithms, by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, MIT Press, 3rd Edition
ii. Data Structures and Algorithms in Java, 6th Edition Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser
iii. Algorithm Design, by Jon Kleinberg and Eva Tardos, Pearsons Publishers
iv. Data Structures and Algorithm Analysis, Edition 3.2 (C++ Version) by Clifford A. Shaffer
v. Data Structures and Algorithms in C++, 2nd Edition by Michael T., Roberto Tamassia and David M. Mount
vi. Algorithms, by Sanjoy Dasgupta, Christos Papadimitriou and Umesh Vazirani

Tentative Schedule:

Week	Topics
Week 1	Discussion on subsequent course plan
Week 2	Assignment 1 Declaration: Array List and Linked List
Week 3	Evaluation of Assignment 1 with Online, Assignment 2 Declaration: Stack
Week 4	Evaluation of Assignment 2 with Online, Assignment 3 Declaration: Queue
Week 5	Evaluation of Assignment 3 with Online, Assignment 4 Declaration: Binary Search Tree
Week 6	Evaluation of Assignment 4 with Online
Enjoy the vacation	
Week 7	Midterm Quiz, Assignment 5 Declaration: Heaps
Week 8	Reserved
Week 9	Evaluation of Assignment 5 with online, Assignment 6 Declaration: Graphs
Week 10	Evaluation of Assignment 6 with online, Assignment 7 Declaration: Divide and Conquer and Greedy Algorithms
Week 11	Evaluation of Assignment 7 with online, Assignment 8 Declaration:Dynamic Programming
Week 12	Evaluation of Assignment 8
Week 13	Final Online with problem solving

Note that the schedule is tentative and can be changed during the course timeline.

Prepared by:	
Name and Designation: Signature:	T. M. Tariq Adnan Assistant Professor, Department of CSE, BUET, Dhaka-1000.