

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:

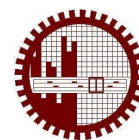
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Course Outline:

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:

- Demonstrate a familiarity with major data structures.
- Analyze the asymptotic performance of different algorithms.
- Apply important algorithmic design paradigms and methods of analysis.
- Assess how the choice of data structures and algorithm design methods impacts the performance of programs.
- 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:

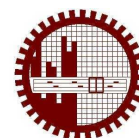
Homework Assignments with Viva: 50-60%

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:	
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