



## COURSE OUTLINE

**Course Code:** CSE 208

**Course Title:** Data Structures and Algorithms II Sessional

**Level/Term:** L2T2 Section: A, B

**Academic Session:** January 2022

**Course Teacher(s):**

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### Course Outline:

Graph algorithms; MST algorithms, Shortest path algorithms, Maximum flow and maximum bipartite matching; Lower bound theory; Advanced data structures: Balanced binary search trees (AVL trees, red-black trees, splay trees etc.), Advanced heaps (Fibonacci heaps, binomial heaps); Hashing; NP-completeness; NP-hard and NP complete problems; Coping with hardness: Backtracking, branch and bound, Approximation algorithms;

### Learning Outcomes/Objectives:

After undergoing this course, students should be able to:

- understand and analyze performance of algorithms in terms of time and space, and prove the correctness of algorithms
- formulate various algorithmic problems and design efficient algorithms to solve those problems,
- solve real world problems using algorithms,
- utilize advanced data structures for efficient implementations of algorithms,
- understand various complexity classes of algorithmic problems , and
- design backtracking, branch and bound and efficient approximation algorithms to cope with

hard combinatorial problems.

**Assessment (tentative):**

Offline + Viva : 25% - 40%

Online + Viva : 25% - 40%

Quiz : 20% - 40%

Attendance : 5-10%

**Text and Reference Books:**

- a. Algorithm Design, by Michael T. Goodrich and Roberto Tamassia, John Wiley & Sons, Inc.
- b. Algorithms, by Sanjoy Dasgupta, Christos Papadimitriou and Umesh Vazirani.
- c. Introduction to Algorithms, by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, MIT Press.
- d. Algorithm Design, by Jon Kleinberg and Eva Tardos, Pearsons Publishers.
- e. Introduction to the Design & Analysis of Algorithms, by Anany Levitin.
- f. Algorithm Design Manual, by Steven S. Skiena.

**Tentative Weekly schedule:**

Week	Topics
Week 1	Introduction - Basic Graph Algorithms (Practice-No grading)
Week 2	Sessional Class - Graph Algorithms (applications of BFS and DFS) - Online, Viva
Week 3	Minimum Spanning Tree (Offline, Online, Viva)
Week 4	Single Source Shortest Path Problem (Offline, Online, Viva)
Week 5	All-Pair Shortest Path Problem (Offline, Online, Viva)
Week 6	Maximum Flow and Maximum Bipartite Matching (Offline, Online, Viva)
Week 7	Mock contest on graph (upto week 6)
Week 8	Advanced Data Structure-I (Offline, Viva) - Binomial and/or Fibonacci Heaps
Week 9	Advanced Data Structure-II (Offline, Viva) - AVL/ Red Black Tree
Week 10	Hashing (Offline, Online, Viva)
Week 11	Reserved
Week 12	NP & NP-Completeness (Online, Viva)
Week 13	Approximation algorithms and/or Branch and Bound algorithms (Offline, Viva)

Week 14	Quiz
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**\* Please DO NOT COPY solutions from anywhere (your friends, seniors, internet etc.). Any form of plagiarism (irrespective of source or destination), will result in getting -100% marks in the online/offline.**

Prepared by:	
Signature:	
Date:	



Form for Course Outline of Dept. of Computer Science and Engineering, BUET