Department of Computer Science and Engineering, BUET

COURSE OUTLINE

Course Code: CSE 208

Course Title: Data Structures and Algorithms II Sessional

Level/Term: L2T2 Section: A1(Mon), A2(Mon), B1(Wed), B2(Sat)

Academic Session: January 2023

Course Teacher(s):

| Name:	E-mail
Dr. Mohammed Eunus Ali	mohammed.eunus.ali@gmail.com
Dr. Md. Shamsuzzoha Bayzid	shams.bayzid@gmail.com
Dr. Atif Hasan Rahman	atif.bd@gmail.com
Dr. Sadia Sharmin	sadia@teacher.cse.buet.ac.bd
Preetom Saha Arko	preetomarko@gmail.com
Rayhan Rashed	rayhanrashed58@gmail.com
Navid Bin Hasan	navidh86@cse.buet.ac.bd
Sheikh Azizul Hakim	sheikh.hakim.2028@gmail.com
Kowshic Roy	vdrkowshic@gmail.com
Khandokar Md. Rahat Hossain	rahat2975134@gmail.com

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:

    i. understand and analyze the performance of algorithms in terms of time and space,

    ii. formulate various algorithmic problems and design efficient algorithms to solve those problems,

    iii. solve real-world problems using algorithms,

    iv. utilize advanced data structures for efficient implementations of algorithms,

    v. understand various complexity classes of algorithmic problems, and

    vi. design backtracking, branch and bound, and efficient approximation algorithms to cope with hard combinatorial problems.
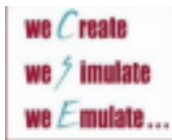
Department of Computer Science and Engineering, BUET

Assessment (tentative):

Offline + Viva : 30% - 50%

Online + Viva : 20% - 40%

Quiz : 20% - 40%

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.

Offline: Same for A1, A2, B1, B2

Release: Wednesday 11:59 pm (Week x)

Submission: Thursday 11:59 pm (week x+1)

Tentative Weekly schedule:

Week	Topics
Week 1	
Week 2	Introduction - Basic Graph Algorithms (BFS, DFS, Topological sort) (Practice)
Week 3	Sessional Class - MST - Online, Viva
Eid Break	
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)
BREAK	
Week 7	Advanced Data Structure-I (Offline, Viva) - Heaps
Week 8	Advanced Data Structure-II (Offline, Viva) - AVL/Red Black Tree
Week 9	Hashing (Offline, Online, Viva)
Week 10	NP & NP-Completeness (Online, Viva)
Week 11	Exact, Approximation Algorithms
Week 12	Branch and Bound (Offline, Online, Viva)
Week 13	Quiz
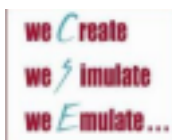
Department of Computer Science and Engineering, BUET

Prepared by:	
Signature: Sadia Sharmin Date:03/06/2023	