

COURSE OUTLINE

Course Code: CSE207

Course Title: Data Structures and Algorithms II

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

Academic Term: Jan 2020

Course Teacher(s): Dr. Md. Abul Kashem Mia, Dr. Md. Shamsuzzoha Bayzid

Name	Office Room	E-mail
Dr. Md. Abul Kashem Mia	ECE 315	kashem@cse.buet.ac.bd
Dr. Md. Shamsuzzoha Bayzid	ECE 521	shams_bayzid@cse.buet.ac.bd shams.bayzid@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, skip lists); Advanced heaps (Fibonacci heaps, binomial heaps); Hashing; String matching algorithms; NP-completeness; NP-hard and NP-complete problems; Coping with hardness: backtracking, branch and bound, approximation algorithms; FFT and its applications.

Learning Outcomes/Objectives:

After undergoing this course, students should be able to:

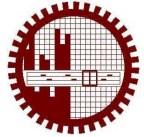
- understand and analyze performance of algorithms in terms of time and space,
- formulate various algorithmic problems and design efficient algorithms to solve those problems,
- solve real world problems using graph algorithms,
- utilize advanced data structures for efficient implementations of algorithms,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

Assessment

Class Tests/Assignments/ Projects:	20%
Attendance:	10 %
Term final :	70%

Text and Reference Books:

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



Weekly Schedule:

Week	Topics	Teacher
Week 1	Review of basic Graph concepts, Single Source Shortest Path Algorithms: Dijkstra's Algorithm	MAKM
Week 2	Single Source Shortest Path Algorithms: Dijkstra's Algorithm, Bellman-Ford Algorithm; All-Pair Shortest Path Algorithms: Floyd-Warshall Algorithm	MAKM
Week 3	MST Algorithms: Kruskal's Algorithm, Prim-Jarnik Algorithm	MAKM
Week 4	Flow Networks, Maximum Flow: Ford-Fulkerson Algorithm; Reduction of Maximum bipartite matching to maximum flow	MAKM
Week 5	AVL trees, Red black trees	MAKM
Week 6	Red black trees, Splay trees	MAKM
Week 7	Skip lists, Lower bound Theory	MAKM
Week 8	Advanced heaps	MSB
Week 9	Hashing	MSB
Week 10	Hashing, String matching algorithms	MSB
Week 11	Reduction, Complexity Classes: P, NP, NP-hard, NP-Complete problems	MSB
Week 12	Hardness of SAT, 3-SAT, vertex cover problem and independent set problem	MSB
Week 13	Approximation Algorithms	MSB
Week 14	Backtracking, Branch and Bound	MSB

Prepared by:

Name: Dr. Md. Abdul Kashem Mia

Signature:

Date:

Name: Dr. Md. Shamuszoha Bayzid

Signature:

Date: