Course Outline for CSE-281

Part A

1. Course Code: CSE-281

2. Course Title: Data Structures and Algorithms

3. Course Type: Core Course

4.Level/ Term: Level: 2 Term: 1

5. Academic Session: 2019-20

6. Course Teacher: Eftekhar Hossain, Lecturer, Dept. of ETE, CUET

7. Prerequisite(s): Basic C Programming

8. Credits: 3

9. Contact Hours: 3 lectures of 50 minutes per week

10. Total Marks: 300

11. Rational of the Course:

This course will cover the basic data structures, and algorithmic techniques used frequently in practical applications: sorting and searching, divide and conquer, greedy algorithms, dynamic programming. This course will provide knowledge on how to sort data and how it helps for searching; how to break a large problem into pieces and solve them recursively; when it makes sense to proceed greedily etc. This a required course for all the students enrolling B. Sc. Engg. in ETE program. The catalogue description of the course is

Course Content:

Concepts and examples of Elementary Data objects, Abstract data types and data structures, Classes and objects, Complexity of Algorithms: worst case, average case, and amortized complexity, Algorithm analysis. Algorithm design paradigms, Lists: stacks, queues, implementation, garbage collection. Dictionaries: Hash tables, binary search trees, AVL trees, red-black trees, splay trees, skip-lists, B-trees. Priority queues. Graphs: Shortest path algorithms, minimal spanning tree algorithms, depth-first and breadth- first search. Sorting: Advanced sorting methods and their analysis, lower bound on complexity, order statistics.

12. Course Objectives:

(a) Be familiar with basic techniques of algorithm analysis

(b) Obtain profound knowledge about basic data structures such as stacks, queues and binary trees.

(c) Be able to implement several sorting algorithms including quicksort, merge sort and heapsort.

(c) Be able to construct some graph algorithms such as shortest path and minimum spanning trees

13. Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

a) CLOs

	Course Learning Outcomes (CLOs)	**Blooms Level (Optional)**
CLO1	Design the appropriate data structure and algorithmic method for a specified application.	
CLO2	Solve complex problems using data structures such as linear lists, stacks, queues, binary trees, heaps, binary search trees, and graphs.	
CLO3	Apply the greedy method, divide and conquer, dynamic programming in order to solve the complex programming problems.	

b) Mapping of CLO with PLO

No.	**(CLOs)**	**PLO1**	**PLO2**	**PLO3**	**PLO4**	**PLO5**	**PLO6**	**PLO7**	**PLO8**	**PLO9**	**PLO10**	**PLO11**	**PLO12**
1	CLO1		X										
2	CLO2			X									
3	CLO3	X											

Part B

14. Course plan specifying content, CLOs, co-curricular activities (if any), teaching learning and assessment strategy mapped with CLOs

`	Topic	Teaching-Learning Methodology	Assessment Method	Corresponding CLOs
Week-01	Introduction to data structures	• Lecture	Class Test Final Exam	CLO-1
Week -02	Introduction to Algorithm analysis	• Lecture	Class Test Final Exam	CLO-1
Week -03	Asymptotic Notation	• Lecture • Assignments	Class Test Final Exam Assignments	CLO-1
Week -04	Stacks and Recursion	• Lecture	Class Test Final Exam	CLO-2
Week -05	Queues and Linked Lists	• Lecture	Class Test Final Exam Assignments	CLO-2
Week -06	Trees and Tree Traversal	• Lecture	Class Test Final Exam Assignments	CLO-2
Week -07	Binary Search Tree and AVL Tree	• Lecture	Class Test Final Exam	CLO-2

Week -08	Searching Algorithms	• Lecture	Class Test Final Exam	CLO-2
Week -09	Divide and conquer, and Greedy Method	• Lecture • Assignments	Class Test Final Exam Assignments	CLO-3
Week -10	Sorting algorithms	• Lecture • Assignments	Class Test Final Exam Assignments	CLO-3
Week -11	Graphs and Graph Traversal	• Lecture • Assignments	Class Test Final Exam Assignments	CLO-3
Week -12	Minimum Spanning Tree, and shortest path algorithms	• Lecture	Class Test Final Exam	CLO-3
Week -13	Hashing and Dynamic Programming	• Lecture	Class Test Final Exam	CLO-3

Part C

15. Assessment and Evaluation

l) Assessment Strategy

Class participation and attendance	10%
Class tests/Class assessment	20%
Term Final Examination (3 hours duration)	70%
Total	100%

2) Marks distribution:

a) Continuous Assessment: 30%

b) Summative: 70%

c) Make-up Procedures:

- Feedback on continuous assessment is given to the students immediately after the test.
- The minimum number of class-test/assignment are (n+1) with best n will be counted (here, n is number of credit). Based on the students' feedback additional class-test/assignment may be taken by the course teacher

Part D

16. Learning Materials

1) Recommended Readings

- Seymour Lipschutz – Data Structures
- Ellis Horowitz, Sartaj Sahni – Fundamentals of Computer Algorithms

2) Others

- Handout/lecture material provided by the course teacher