C3A (10)
DS-01

Department of Computer Science and Engineering
Lesson Plan:

Course Title: Data Structure
Level/Term: 2/1
Credit: 03
Prerequisite: Introduction to Computer System, Structured Programming
Session: September, 2018.

Course Code: CSE 221
Section: A
Contact Hours: 26
Type: Core/Major:

Instructor: Farhana Shirin Chowdhury, Assistant Professor, DCSE
Class schedule: Monday : 9.30 AM-11 AM
Tuesday: 10AM-11.30AM
Counseling Time: Saturday: 2.30 PM-3.30 PM
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Room No: 408, 508
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Rationale:
The purpose of this course is to provide the students with solid foundations in the basic concepts of data structures and algorithms. The main objective of the course is to teach the students how to select and design data structures and algorithms that are appropriate for problems that they might encounter. This course offers the students a mixture of theoretical knowledge and practical experience by covering the topics analysis of algorithms, arrays, trees, binary search trees, multi-way search trees, dictionaries, hash tables, graphs, graph traversals, graph algorithms, sorting.

Course Objectives:
1. To allow to assess how the choice of data structures and algorithm design methods impacts the performance of programs.
2. To choose the appropriate data structure and algorithm design method for a specified application.
3. To learn the systematic way of solving problems, various methods of organizing large amount of data.
4. To solve problems using data structures such as linear lists, stacks, queues, hash tables, binary trees, heaps, binary search trees, and graphs and writing programs for these solutions.
5. To efficiently implement the different data structures and solutions for specific problems.

Course Outcomes (COs):
1. Students develop knowledge of basic data structures for storage and retrieval of ordered or unordered data. Data structures include: arrays, linked lists,queue,stack, binary trees, binary search trees, heaps and graphs.
2. Students develop knowledge of applications of data structures including the ability to implement algorithms for the creation, insertion, deletion, searching, and sorting of each data structure.
3. Students learn to analyze and compare algorithms for efficiency using Big-O notation.

Text and Reference books:
1. Data Structures (Third Edition), by Seymour Lipschutz, Publishers: McGraw-Hill
2. Classic Data Structures, by D. Samanta, Publishers: Prentic-Hall of India Private Limited

Teaching Strategy: Typical methodologies are Class lectures, web-access, self-study, critics writing, problem formulation, and student presentation.

Assessment Strategy: class attendance (10%), quiz/assignments/home works (10%),Class tests(10%), midterm exam(20%) and final exam(50%).

Daily schedule:

Week	Topic	Teaching strategy	Course outcome	Assessment Strategy
Day 1	Introduction: Definitions, Concepts, Overview and Implementation. Complexity of algorithm	Lecture, Problem solution, Video, Web Link	CO1	**Midterm Examination Final Examination**
Day 2	**String Processing: String Operations ,Word Processing**	Lecture, Problem solution, Video, Web Link	CO1	**Midterm Examination Final Examination**
Day 3	Pattern Matching Algorithm: First Pattern Matching Algorithm ,Second Patter Matching Algorithm	Lecture, Problem solution, Video, Web Link	CO1,CO3	**Assignment**
Day 4	Array : Definition, Operations, Memory Allocation, Operations of Array : Traversing, Insertion, Deletion	Lecture, Problem solution, Video, Web Link	CO1	**Midterm Examination, CT-1 Final Examination**
Day 5	Searching : Linear Search , Binary Search, Sorting : Bubble Sort	Lecture, Problem solution, Video, Web Link	CO1,CO2,CO3	**Midterm Examination Final Examination**
Day 6	Sorting :Insertion Sort, Sorting: Selection Sort ,Radix Sort	Lecture, Problem solution, Video, Web Link	CO1,CO2,CO3	**Midterm Examination, CT-1 Final Examination**
Day 7	Sorting: Merge Sort, Multi-dimensional Array: Memory Representation, Sparse Martix,**CT-1**	Lecture, Problem solution, Video, Web Link	CO1CO2	**Midterm Examination Final Examination**
Day 8	Linked list: Definition of Single linked list, Memory Representation, Traversing, Linked list: Searching(sorted and unsorted list)	Lecture, Problem solution, Video, Web Link	CO1,CO2	**Midterm Examination Final Examination**
Day 9	Linked list: Memory Allocation (Garbage Collection), Overflow and Underflow, Insertion at the Beginning of the List, Linked List: Insertion after a Given Node, Inserting into a sorted list	Lecture, Problem solution, Video, Web Link	CO1,CO2	**Midterm Examination CT-2, Final Examination**
Day 10	Linked List: Deletion from a given node, Deletion with a given ITEM	Lecture, Problem solution, Video, Web Link	CO1,CO2	**CT-2, Final Examination**
Day 11	Header Linked List : Basic, Polynomial	Lecture,	CO1	**Assignment,**

	Two Way List: Operations, Two Way List: Operations	Problem solution, Video, Web Link		**Final Examination**
Day 12	Stack: Definition, Array Representation, Stack: Linked List, Push and Pop, Evaluation of Arithmetic Expression **CT2**	Lecture, Problem solution, Video, Web Link	CO1,CO2	**Final Examination**
Day 13	Stack: Polish Notation, Quicksort, Stack: Recursion, factorial	Lecture, Problem solution, Video, Web Link	CO1,CO3	**CT-3, Final Examination**
Day 14	Stack: Ackerman Function, Stack: Tower of Hanoi Queue: Array Representation, Linked List Representation	Lecture, Problem solution, Video, Web Link	CO1,CO3	**CT-3, Final Examination**
	Midterm Examination			
Day 15	Queue: Insertion, Deletion, Deque: Insertion, Deletion	Lecture, Problem solution, Video, Web Link	CO2	**Final Examination**
Day 16	Priority Queue: Insertion, Deletion	Lecture, Problem solution, Video, Web Link	CO1,CO2	**Final Examination**
Day 17	Tree: Basic Terminology, Binary Tree, Properties of Binary Tree, Tree: Linear Representation of Binary Tree, Operations of Binary Tree (Insertion and Deletion) **CT3**	Lecture, Problem solution, Video, Web Link	CO1,CO2	**Final Examination**
Day 18	Tree: Operations of Binary Tree (Searching and traversing)	Lecture, Problem solution, Video, Web Link	CO1,CO2	**Final Examination**
Day 19	Tree: Expression Tree, Binary Search Tree: Insertion, Deletion	Lecture, Problem solution, Video, Web Link	CO1,CO2	**Final Examination, CT-4**
Day 20	Tree: Heap Tree, Types of Heap Tree, Operations of Heap Tree (Insertion)	Lecture, Problem solution, Video, Web Link	CO1,CO2	**Final Examination, CT-4**
Day 21	Tree: Operations of Heap Tree (Deletion, Merging) , Basics of Weighted Binary Tree	Lecture, Problem solution, Video, Web Link	CO1,CO2	**Final Examination, CT-4**
Day 22	Tree: Weighted Binary Tree (Huffman Tree), Tree: AVL Search Tree: Basics of AVL Tree, Insertion	Lecture, Problem solution, Video, Web Link	CO1,CO2	**Final Examination, CT-4**
Day 23	Tree: AVL Search Tree: Insertion, Deletion	Lecture, Problem	CO1,CO2	**Final Examination**

		solution, Video, Web Link		
Day 24	Tree: B- Tree (Insertion and Deletion)	Lecture, Problem solution, Video, Web Link	CO1,CO2	**Final Examination**
Day 25	Graph: Basic Terminology, Path Matrix,BFS,**CT-4**	Lecture, Problem solution, Video, Web Link	CO1,CO2	**Final Examination**
Day 26	Graph: DFS Hashing: Definition, Methods	Lecture, Problem solution, Video, Web Link	CO1,CO2	**Final Examination**