

219 CSM Course Syllabus

Course Code	219 CSM
Course Name	Data Structures & Algorithms
Credit Hours	3
Contact Hours	4
Instructor Name	Dr. Amjad

Text Book (title, author, and year)

- “Java Collections - An Introduction to Abstract Data Types, Data Structures and Algorithms” by Watt and Brown, Wiley 2001,
- “Data Structures and Algorithms in JAVA” by Goodrich, Tamassia, and Mount, John Wiley & Sons.
- “Data Structures and the Standard Template Library” by Collins (McGraw-Hill)

Specific Course Information

Catalog Description	Intelligent agent, problem solving and search, game playing, knowledge representation, and machine learning, and robotics. Neural Networks and Fuzzy systems. In the laboratory, course topic based experiments are designed to increase the subject understanding
Prerequisites	122 CPE Object Oriented Programming
Co-requisites	NIL
Required/Elective	required

Course Learning Outcomes

1	Define concepts of Object Oriented Programming and different Data Structures
2	Recognise the computer science problems
3	Develop an ability to drive different solution alternatives for the computer science problems
4	Develop an ability to analyse the solution alternatives and choose the optimum one
5	Design, build and develop programs of varying levels of complexity using JAVA
6	Use data structures effectively to solve practical problems
7	Develop an ability to write java programs using different data structures

Mapping course LOs to the SLO.

Course LOs #	Student Learning Outcomes											
	a1	a2	b1	b2	b3	b4	b5	c1	c2	c3	d1	d2
1	√											
2			√									
3			√		√							
4					√							
5				√								
6				√								
7				√								

List of Theory Topics

Introduction to analysis of Algorithms: Define algorithm, properties of algorithms, algorithm analysis, Asymptotic notations, The Best, Average, and Worst Case Analyses.

Data structure: Data structure, Types of Data structures, Basic concept on Array-Linked Lists: Introduction, Singly Linked Lists and its Basic Operations – Insertion, Deletion and Search. Doubly Linked-Lists, Circular Linked Lists.

Stacks: Introduction to Stack, Basic Operations on Stacks, and applications of Stack.

Recursion: Introduction to recursion, Factorial of a number, Tower of Hanoi, Recursion and stack

Queues: Introduction to Queue, Basic operations on Queue, and applications of Queue. Priority Queues

Searching: Linear or Sequential Search and Binary Search.

Sorting Techniques: Selection Sort, Bubble Sort, and Merge Sort.

Trees: Definitions, properties, ordered trees, traversal algorithms, Binary trees, Binary tree traversal algorithms.

Graphs: Simple graphs, Graph terminology, Paths and Cycles, Graph traversal algorithms

List of Lab Experiments

1. Revision on Java Program to demonstrate Arrays
2. Operation on Arrays; Searching, Deletion Multi-Dimension Arrays.
3. Insert and Display Elements of a Linked List Delete an Element from a Linked List.
4. Program to demonstrate Stack. Operation of Stack ; *push()*, *pop()*, *isEmpty()*, *isFull()*, *search()*
5. Reversing a Word. Converts infix arithmetic expressions to postfix.
6. Recursive method to implement Tower of Hanoi Puzzle. Recursive program on stack.
7. Queue and Queue implementation
8. Linear Search and Binary Search
9. Selection Sort, Bubble Sort, Merge Sort
10. Creation of Tree, Implementation of In-Order, Pre-order, Post Order Tree Traversal.
11. Graphs and its operations.