



Gyanmanjari
Innovative University

Course Syllabus
Gyanmanjari College of Computer Science
Semester-3 (BSC IT)

Subject: Data Structure - BSCIT13308

Type of course: Major Core

Prerequisite: Basic knowledge of C programming

Rationale:

This course introduces the fundamentals of Data Structures for problem-solving, analyzing, and developing algorithms. It aims to implement various linear Data Structures like the Stack, Queue, and Linked List and understand different Sorting and Searching techniques.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
CI	T	P	C	SEE		CCE			
				Theory	Practical	MSE	LWA	ALA	
3	0	2	4	75	25	30	20	50	200

Legends: CI-Class Room Instructions; T – Tutorial; P - Practical; C – Credit; SEE - Semester End Evaluation; MSE- Mid Semester Examination; LWA - Lab Work Assessment; V – Viva voce; CCE- Continuous and Comprehensive Evaluation; ALA- Active Learning Activities.

Course Content:

Sr. No	Course content	Hrs	% Weightage
1	Introduction to Linear Data Structures: Array and Stack Data representation, Data Types – Primitive and Non-Primitive Data Types, Data Structures, Algorithms, Time Complexity and Space Complexity Array - Representation of Arrays, Two-Dimensional Array, Multi-Dimensional Array, Sparse Matrix, Applications of Array Stack - Introduction, Operations on Stack (Push, Pop, Peep), Applications of Stack	11	25%
2	Linear Data Structures: Queue and Linked List Queue - Introduction, Operations on Queue (insertion and deletion), Circular Queue, Priority Queue, Double Ended Queue (DEqueue),	12	30%



	Applications of Queue Linked List - Introduction, Memory Allocation in Linked List, Operations on Linked List (Creation, Insertion, Deletion), Types of Linked List (Singly Linked List, Doubly Linked List, Circular Linked List), Applications of linked list		
3	Nonlinear Data Structure: Tree Definitions and Concepts, Introduction to Binary Tree, Operations on Tree (Insert, Delete and Search the specific node, Calculate height and no. of nodes in a tree), Binary Tree Traversal (Preorder, Inorder & Postorder)	11	20%
4	Hashing, Sorting and Searching Introduction to hashing table, Hashing Functions (Division Method, Multiplication Method, Mid-Square Method), Applications of Hashing Sorting – Introduction, Different Kind of Sorts: Bubble Sort, Selection Sort, Insertion Sort, Merge Sort, Quick Sort Searching – Concepts, Methods: Linear Search, Binary Search	11	25%

Continuous Assessment:

Sr. No	Active Learning Activities	Marks
1	Building Bridges: Students have to create user manual or documentation for specific data structure, explaining their usage and methods. Also, they have to upload it on GMIU Web Portal.	10
2	Comparison task: Students have to Compare Different Data structures and its storage patterns, and they have to upload it on GMIU Web portal.	10
3	Visualize the flow : Students have to create animations for the different data structures and they have to upload it on GMIU Web portal.	10
4	Find the application: Students have to find and create a documentation on different applications of Hashing, Sorting and Searching method and they have to upload it on GMIU Web portal.	10
5	Attendance	10
Total		50

Suggested Specification table with Marks (Theory):75

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Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	25%	45%	15%	15%	0	0

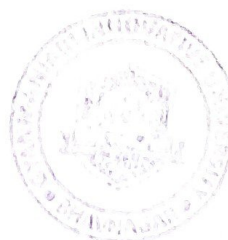
Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcome:

After learning the course the students should be able to:	
CO1	understand the concept of linear data structure array and stack.
CO2	describe the working of linear data structure queue and linked list.
CO3	manipulate data using non-linear data structure tree.
CO4	explain various hashing methods and their requirements.
CO5	implement various searching and sorting techniques.

List of Practical

Sr. No	Descriptions	Unit No	Hrs
1	Introduction to pointers. Call by Value and Call by reference.	1	2
2	Introduction to Dynamic Memory Allocation. DMA functions malloc (), calloc(), free() etc.	1	2
3	Implement a program for performing all stack operations using array	1	4
4	Write a program to implement QUEUE using arrays that performs following operations (a) INSERT (b) DELETE (c) DISPLAY	1	4
5	Write a menu driven program to implement following operations on the singly linked list. (a) Insert a node at the front of the linked list. (b) Insert a node at the end of the linked list. (c) Insert a node such that linked list is in ascending order. (According to info. Field) (d) Delete a first node of the linked list. (e) Delete a node before specified position. (f) Delete a node after specified position	2	4
6	Write a program to implement stack using linked list.	2	4



7	Write a program to implement queue using linked list.	2	4
8	Write a program which create binary search tree	2	4
9	Write a program to implement Insertion sort Algorithm.	2	1
10	Write a program to implement Binary Search Algorithm.	3	1

Instructional Method:

The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done on the basis of Active Learning Assignment

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

Reference Books:

- [1] Data and File Structures using C, by Recma Thareja , Oxford University Press
- [2] Data Structures using C & C++, by Andrew S. Tanenbaum, PHI
- [3] An Introduction to Data Structures with Applications, by Jean-Paul Tremblay & Paul G. Sorenson, Tata McGraw Hill
- [4] Fundamentals of Data Structures in C++ , by Sartaj Sahani

