



MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

COURSE PLAN

Department	:	Data Science and Computer Applications			
Course Name & code	:	Data structures & DSE 2155			
Semester & branch	:	III & BTECH DATA SCIENCE & ENGINEERING			
Name of the faculty	:	Mrs. Linda Varghese & Dr. Savitha G			
No of contact hours/week:		L	T	P	C
		3	1	0	4

Course Outcomes (COs)

At the end of this course, the student should be able to:		No. of Contact Hours	Marks
CO1:	Relate the concepts of arrays, dynamic memory management, class, searching, sorting	13	29
CO2:	Illustrate the working of linear and non-linear data structure	13	29
CO3:	Apply the basics of structured concepts	09	19
CO4:	Solve problems related to linear and non-linear data structures.	07	15
CO5:	Understanding unstructured and semi structure data applications	06	08
Total		48	100

Assessment Plan

Components	Assignments	Sessional Tests	End Semester/ Make-up Examination
Duration	20 to 30 minutes	60 minutes	180 minutes
Weightage	20 % (4 X 5 marks)	30 % (2 X 15 Marks)	50 % (1 X 50 Marks)
Typology of Questions	Understanding; Applying; Analyzing; Evaluating; Creating	Remembering; Understanding; Applying	Understanding; Applying; Analyzing; Evaluating; Creating
Pattern	Answer one randomly selected question from the problem sheet (Students can refer their class notes)	MCQ (10 marks): 10 questions of 0.5 marks each Short Answers (10 marks): questions of 2 or 3 marks	Answer all 5 full questions of 10 marks each. Each question may have 2 to 3 parts of 3/4/5/6/7 marks
Schedule	As notified by Associate Director (Academics) at the start of each semester	Calendared activity	Calendared activity
Topics Covered	Assignment 1 (L 0-11 & T _{y1-y2}) (CO1-2)	Test 1 (L 0-22 & T _{b1-b2}) (CO1-2)	Comprehensive examination covering full syllabus. Students are expected to answer all questions (CO1-4)
	Assignment 2 (L 12-23 & T _{y3-y4}) (CO2, 4)		
	Assignment 3 (L 24-33 & T _{y5-y6}) (CO2, 3)	Test 2 (L 23-37 & T _{b3-b4}) (CO2-3)	
	Assignment 4 (L 34-43 & T _{y7-y8}) (CO2, 3)		

Lesson Plan

L. No.	Topics	Course Outcome Addressed
L0	Introduction to Data Structures	CO1
L1	Classification of Data Structures	CO1
L2	Abstract Data Types, Basics of C++	CO2
T1	Review of basic C++ programs	CO1, CO2
L3	Arrays: The array as Abstract Data Type (ADT), Sparse Matrix-Representation	CO2
L4	Representation of Polynomial, operations	CO2
L5	Recursion concepts	CO1
T2	Matrices: Mapping of 2D arrays to 1D arrays Sparse matrix and Polynomial representation	CO1, CO2
L6	Application of recursion	CO2

L7	Stacks: Definition, Operations of stacks	CO2
L8	Application of stacks: Parenthesis matching	CO2
T3	String operations, Stack - implementation, operations	CO2
L9	Stack Applications: Conversion of infix to prefix expression	CO2
L10	Stack Applications: Conversion of infix to postfix expression	CO2
L11	Stack Applications: Evaluation of postfix and prefix expressions , multiple stacks	CO2
T4	Review of stack applications with examples	CO
L12	Queues: Definition, Operations	CO1
L13	Circular queue, types of queue	CO2
L14	Concepts of pointers and structures	CO2
T5	Review of operations on Queue and Circular Queue with implementation details	CO
L15	Singly Linked List operations : traversal and deletion	CO4
L16	Doubly Linked list : creation, insertion, deletion and traversal	CO4
L17	Circular singly linked list operations : creation, insertion, traversal and deletion	CO4
L18	Dynamic Linked Stacks and Queues , Polynomial operations using singly linked list	CO4
L19	Trees: Introduction, Tree terminology	CO4
T6	Review of operations of Singly Linked List	CO4
L20	Binary Trees types: Strictly Binary Tree, Complete Binary tree, Almost complete Binary Tree	CO2
L21	Memory Representation of Binary Tree, Abstract Data Type, Properties of Binary tree	CO2
L22	Binary Tree Traversal- Preorder, inorder, postorder	CO2
T7	Review of operations of Doubly Linked List	CO
L23	BFS, DFS, General tree	CO2
L24	Binary tree construction	CO2
L25	Expression Tree, Decision Tree	CO2
L26	Introduction to Binary Search Trees and basic operations	CO2
T8	Review of operations on Binary Search Tree	CO
L27	Threaded Binary Tree, Introduction to AVL trees, Balance Factor	CO3
L28	AVL Rotations, insertions	CO3
L29	Introduction to Heap- Max heap, Min heap - Insertion, deletion,	CO3

T9	Implementation of Linear search and Binary search	CO3
L30	Heapsort – ascending, descending	CO3
L31	Multiway tree, B tree insertion	CO3
T10	Implementation of Bubble, insertion and selection sort	CO3
L32	B tree deletion	CO2
L33	B+ tree- insertion and deletion	CO2
L34	Graph Introduction – Terminologies	CO2
T11	Implementation of quick sort, merge sort	CO5
L35	Elementary Graph Operations, Graphstorage structure – Adjacency list, matrix	CO2
L36	Graph traversal - Depth First Search, Breadth First Search, examples	CO1
T12	Implementation of storage representation of graph	CO4
L/T	Summary, conclusion	

References:

1. Ellis Horowitz, SartajSahni, Dinesh Mehta, Fundamentals of Data Structures in C++, 2nd Edition, GalgotiaPublications, Reprint 2013
2. Behrouz A Foruzan, Richard F Gilberg, A Structured Programming Approach using C, 3E, Cengage, Learning India Pvt Ltd. India 2007
3. Behrouz A. Forouzan, Richard F. Gilberg, Data Structures, A Pseudocode approach Using C, 2e, Cengage, learning India Pvt.Ltd, India, 2009.
4. Ellis Horowitz, Sartaj Sahni, Dinesh Mehta, Fundamentals of Data Structures in C, 2nd Edition Univertsities Press (India) Private Limited, Reprint, 2013
5. Debasis Samanta, Classic Data structures- 2nd edition, PHI Learning Private Limited , 2010
6. Mark Allen Weiss, Data Structures and Algorithm Analysis in C++, 2nd Edition, Pearson Education, 2005.
7. Michael T, Goodrich, Roberto Tamassia, David Mount, Data Structures and Algorithms in C++, 2nd Edition, John Wiley & Sons, 2011

Submitted by: Mrs. Linda Varghese & Dr. Savitha G

(Signature of the faculty)

Date: 09-06-2021

Approved by: DR RADHIKA M PAI

(Signature of HOD)

Date: 09-06-2021

FACULTY MEMBERS TEACHING THE COURSE (IF MULTIPLE SECTIONS EXIST):

FACULTY	SECTION	FACULTY	SECTION
Mrs. Linda Varghese	A		
Dr. Savitha G	B		
