



MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

B. Tech. School of Computer Engineering

COURSE PLAN: LABORATORY COURSE

Department:	School of Computer Engineering			
Course Name & code:	CSS 2111 Data Structures Laboratory			
Semester & branch:	III	Common all SCE		
Name of the faculty:	Dr V. Sivakumar			
No of contact hours/week:	L	T	P	C
	0	0	3	3

Course Outcomes (COs)

At the end of this course, the student should be able to:		No. of Contact Hours	Marks
CO1	Apply dynamic memory management, recursion, pointer-based techniques, and efficient searching and sorting algorithms to build optimized and flexible data-driven applications.	9	26.5
CO2	Design and implement applications using basic linear data structures such as arrays and linked lists to organize and process data in real-world problems.	12	33
CO3	Implement and apply restricted access linear data structures such as stacks and queues, and non-linear data structures such as trees and graphs, to perform structured data processing, traversal, and application-specific problem solving.	15	40.5
Total		36	100

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PS03	PS04
CO1	3	2	2		2							2	2	2		
CO2	3	2	2		2							2	2	2		
CO3	3	2	2		2							2	2	2		
Average Articulation Level	3	2	2		2							2	2	2		

ICT Tools used in delivery and assessment

Sl. No	Name of the ICT tool used	Details of how it is used
1	Code:Blocks	It provides all the tools you need to write, compile, run, and debug your programs efficiently.
2	MS Teams	To upload materials

Mapping of Course Outcomes (COs)/Course Learning Outcomes (CLOs)

At the end of this course, the student should be able to:		No. of Contact Hours	Marks	Program Outcomes (POs)	Learning Outcomes (LOs)	BL (Recommended)
CLO1	Apply dynamic memory management, recursion, pointer-based techniques, and efficient searching and sorting algorithms to build optimized and flexible data-driven applications.	9	26.5	1,2,3,5,12	1	3
CLO2	Design and implement applications using basic linear data structures such as arrays and linked lists to organize and process data in real-world problems.	12	33	1,2,3,5,12	1,2	3
CLO3	Implement and apply restricted access linear data structures such as stacks and queues, and non-linear data structures such as trees and graphs, to perform structured data processing, traversal, and application-specific problem solving.	15	40.5	1,2,3,5,12	1,3	3
Total		36	100			

Applicable to IET Accredited Programs Only

Delivery and Assessment Plan of LOs

Learning Outcome (LO) mapped to the course		Delivery and assessment Plan
LO	LO statement	
1	Apply knowledge of mathematics, statistics, natural science and engineering principles to the solution of complex problems. Some of the knowledge will be at the forefront of the particular subject of study	Delivery Lectures, Problem Solving and, In the lab, faculty will evaluate the execution of each program, monitor record writing, and conduct tests

3	Select and apply appropriate computational and analytical techniques to model complex problems, recognising the limitations of the techniques employed	Delivery Lectures, Problem Solving and, In the lab, faculty will evaluate the execution of each program, monitor record writing, and conduct tests
4	Select and evaluate technical literature and other sources of information to address complex problems	Delivery Lectures, Problem Solving and, In the lab, faculty will evaluate the execution of each program, monitor record writing, and conduct tests

Applicable to IET Accredited Programs Only

ASSESSMENT PLAN

Components	Continuous Evaluation: Experiments/Open Ended experiments	End semester Examination
Duration	3 Hours per week	120 Minutes
Weightage	60%	40%
Typology of questions	Application-oriented questions specifically designed for a Data Structures Lab	Application-oriented questions specifically designed for a Data Structures Lab
Pattern	In the lab, we will evaluate the execution of each program, monitor record writing, and conduct tests	Answer to the question is mandatory. No choices will be given. Marks split: Write-up – 15 marks, Execution – 25 marks.
Schedule	Weekly	Last week of the semester
Topics	As per syllabus	Experiments, Individual
Mode of Conducting	Individual	Individual

Lesson Plan

Expt No	Title of the Experiment	CO Addressed
1	BASIC SEARCHING AND SORTING-METHODS USING ARRAY CONCEPTS	1
2	POINTERS, RECURSION AND DYNAMIC MEMORY ALLOCATION FUNCTIONS	1
3	STRINGS AND STRUCTURE-CONCEPTS AND APPLICATIONS	1
4	SINGLY LINKED LIST- CREATION AND OPERATIONS	1,2
5	DOUBLY LINKED LIST- INSERTION, DELETION AND TRAVERSAL	1,2
6	POLYNOMIALS USING LINKED LIST AND CIRCULAR LIST	1,2
7	STACKS - ARRAY AND LINKED LIST IMPLEMENTATION AND ITS APPLICATIONS	1,3
8	QUEUES - ARRAY AND LINKED LIST IMPLEMENTATION AND ITS APPLICATIONS	1,3
9	BINARY TREE CREATION AND TRAVERSALS	1,3
10	BINARY SEARCH TREES AND AVL TREE OPERATIONS	1,3
11	GRAPH REPRESENTATION AND TRAVERSALS	1,3

References:

1. Forouzan, B. A., & Gilberg, R. F. (2007). *A Structured Programming Approach Using C* (3rd ed.). Cengage Learning India Pvt. Ltd.
2. Horowitz, E., Sahni, S., Anderson-Freed, S. (2007). *Fundamentals of Data Structures in C* (2nd ed.). Silicon Press.
3. Gilberg, R. F., & Forouzan, B. A. (2009). *Data Structures: A Pseudocode Approach with C* (2nd ed.). Cengage Learning India Pvt. Ltd.
4. Tenenbaum, A. M., Langsam, Y., & Augenstein, M. J. (2007). *Data Structures Using C*. Pearson Prentice Hall of India.
5. Samanta, D. (2010). *Classic Data Structures* (2nd ed.). PHI Learning Pvt. Ltd.

Submitted by: **Dr V. SIVAKUMAR**

(Signature of the faculty)

Date:

Approved by:

(Signature of Dean)

Date:

Dr. Smitha N. Pai
Prof. and Assoc. Dean
School of Computer Engineering
M. I. T., Manipal - 576104

Faculty members teaching the course (if multiple sections exist):

MIT/GEN/F-01/R4-UGL

Faculty	Section	Faculty	Section
Mrs Ramya D Shetty	CSE A1 &A2	Dr Raghavendra S	CCE B1&B2
Dr Venkatesh Bhandage	CSE B1	Dr Chetana Pujari	CCE C1&C2
Dr D Cenitta	CSE B2	Mrs Linda Varghese	CCE D1&D2
Dr V. Sivakumar	CSE C1	Mr Shanmukharaja	AIML A1&A2
Dr Ujjwal	CSE C2	Dr Diana Olivia	AIML B1&B2
Dr. Harish S V	CSE D1 & D2	Dr Diana Olivia	AIML C1
Dr Anita Kini	IT A1 &A2	Mrs Ramya D Shetty	AIML C2
Dr Ahamed Shafeeq BM	IT B1 &B2	Mr Shanmukharaja	DSA A1
Dr. Anup Bhat	IT C1	Dr. Anitha Kini	DSA A2
Dr Ujjwal	IT C2	Mr Shiva Prasad G	DSA B1
Mr. Ganesh Babu	IT D1	Dr Saraswati Koppad	DSA B2
Dr. Anitha Kini	IT D2	Dr Vidya Kamath	DSA C1 &C2
Dr Venkatesh Bhandage	CCE A1&A2		