



National Institute of Technology Meghalaya

An Institute of National Importance

CURRICULUM

		National Institute of Technology Meghalaya An Institute of National Importance											CURRICULUM					
Programme		Bachelor of Technology in Computer Science and Engineering											Year of Regulation			2019-2020		
Department		Computer Science and Engineering											Semester			III		
Course Code	Course Name	Credit Structure												Marks Distribution				
		L	T	P	C	INT	MID	END	Total									
CS 201	Data Structures	3	0	0	3	50	50	100	200									
Course Objectives	To understand the fundamental concept of data structures and algorithms.	Course Outcomes	CO1	Students shall be able to understand of basic concepts of dynamic memory management, data types, algorithms, asymptotic notation and basic data structures.														
	To develop skill for choosing data structures for different applications.		CO2	Students shall be able to design, analyze and implement searching and sorting algorithms using different data structures for various applications.														
	To develop skill for solving problems using algorithm design techniques such as divide and conquer and writing programs for these solutions.		CO3	Students shall be able to find the bugs in programs with data structures, formulate new solutions and improve in existing code using learned algorithms and data structures														
	To develop skill for designing, analyzing, correctness and implementing algorithms using various data structures.		CO4	Students shall be able design of algorithm for representing and implementing nonlinear data structure such as Tree, Graph in real world applications.														
	To implement hashing, linear and nonlinear data structures for real word application as per requirements.		CO5	Students shall be able to analysis of algorithms in terms of space and time complexities for different application using linear and nonlinear data structures.														
			CO6	Students shall be able to realize the basic concepts of hashing schemes, collision concepts and implement hashing shames for applications.														
No.	COs	Mapping with Program Outcomes (POs)												Mapping with PSOs				
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3		
1	CO1	3	2	3	2	2	0	0	1	2	0	0	0	3	2	3		
2	CO2	2	2	3	3	1	0	1	1	2	1	2	2	2	3	2		
3	CO3	1	3	3	2	2	0	2	2	1	1	2	0	2	3	3		
4	CO4	2	3	3	3	2	1	1	1	1	1	2	2	2	2	3		
5	CO5	2	2	3	3	2	1	1	1	1	1	2	2	3	2	3		
6	CO6	2	3	3	2	1	1	1	1	1	1	2	2	3	2	2		
SYLLABUS																		
No.	Content													Hours	COs			
I	Introduction & Overview: Concept of data type, definition and brief description of various data structures, operations on data structures, algorithm complexity, Big Oh notation, recursion, some illustrative examples of recursive functions. Review of Pointers and Dynamic Memory Management: Understanding pointers, usage of pointers, memory management functions, debugging pointers. Arrays: Linear and multi-dimensional arrays and their representation, operations on arrays, sparse matrices and their storage.													10	CO1 CO2			
II	Linked Lists: Linear linked list, operations on linear linked list, doubly linked list, operations on doubly linked list, application of linked lists. Stacks: Sequential and linked representations, operations on stacks, multi stacks, application of stacks such as parenthesis checker, evaluation of postfix expressions, conversion from infix to postfix representation, implementing recursive functions. Queues: Sequential representation of queue, linear queue, circular queue, operations on linear and circular queue, linked representation of a queue and operations on it, priority queues, applications of queues.													11	CO2 CO3			
III	Sorting & Searching: Sorting arrays using bubble sort, selection sort, insertion sort, quick sort, merge sort, heap sort, shell sort, tree sort, radix sort, etc., searching an element using linear search and binary search techniques, concatenation of arrays and merging sorted arrays. Heaps: Representing a heap in memory, operations on heaps, application of heap in implementing priority queue and heapsort algorithm.													05	CO3 CO4			
IV	Trees: Basic terminology, array and linked representations of trees, traversing a binary tree using recursive and non-recursive procedures, inserting a new node, deleting a node, counting nodes, finding height, finding a mirror image of a binary tree, threaded binary trees, AVL trees and B-trees. Graphs: Basic terminology, representation of graphs (adjacency matrix, adjacency list), traversal of a graph (breadth first search and depth-first search), adding nodes, deleting nodes, applications of graphs in problems such as finding shortest paths, obtaining minimum cost spanning tree, etc.													10	CO4 CO5			
V	Hashing: Comparing direct address tables with hash tables, hash functions, concept of collision and its resolution using open addressing and separate chaining, double hashing, rehashing													03	CO5 CO6			
Total Hours													39					
Essential Readings																		
1. Dr. D.S. Kushwaha, Dr. Arun Kumar Mishra, "A Programming approach with C ", 2 nd Edition, PHI India, 2014.																		
2. Seymour Lipschutz, "Data Structures", Revised 1 st Edition, Tata McGraw hill Publication, 2013.																		

3. Mark Allen Weiss, "Data Structures And Algorithm Analysis In C", 2nd Edition, Pearson Education, 2002.

Supplementary Readings

1. A.K. Sharma," Data Structures using C", Pearson, 2011.

2. Yedidyah Langsam, Aaron M. Tenenbaum, Moshe J. Augenstein, "Data Structures Using C and C++, 2nd Edition, PHI, 2011.

3. Kyle Loudon ,"Mastering Algorithms With C Useful Techniques From Sorting To Encryption"1st Edition, O'Reilly, 2009.