

Data Structures & Algorithms					
Credit Hours:	3	Course Code:	INFT-2107	Prerequisites:	OOP
Course Learning Outcomes (CLOs):					
At the end of the course, the students will be able to:				Domain	BT Level*
1. Implement various Data Structures & Algorithms and their algorithms and apply them in implementing simple applications				C	3
2. Apply the knowledge of data structure to other application domains.				C	3
3. Analyze simple algorithms and determine their complexities.				C	5
4. Design new Data Structures & Algorithms and algorithms to solve problems.				C	6
* BT= Bloom’s Taxonomy, C=Cognitive Domain, P=Psychomotor Domain, A=Affective Domain					
#	SDG	Relevant CLOs			
1	SDG 4: Quality Education	CLO 2: Analyze simple algorithms and determine their complexities.			
2	SDG 9: Industry, Innovation and Infrastructure	CLO 3: Apply the knowledge of data structure to other application domains. CLO 4: Design new data structures and algorithms to solve problems.			
Course Contents:					
Abstract data types, complexity analysis, Big-O notation, stacks (linked list and array implementations), recursion and analyzing recursive algorithms, divide and conquer algorithms, sorting algorithms (selection, insertion, merge, quick, bubble, heap, shell, radix, bucket), expression parsing using stacks, queues and variants (dequeue, priority queues), linked lists (including sorted linked lists), searching (unsorted and binary search), hashing and indexing (open addressing and chaining), trees and traversals, expression trees, binary search trees, heaps, M-way trees, balanced trees (AVL, Red Black), graphs, breadth-first and depth-first traversal, topological order, shortest path, adjacency matrix and list, dynamic programming, greedy algorithms, backtracking, amortized analysis, minimum spanning trees, algorithm correctness and complexity classes.					
Teaching Methodology:					
Lectures, Written Assignments, Practical labs, Semester Project, Presentations.					
Course Assessment:					
Mid Term Exams, Final Term Exams, Assignments, Quizzes, Project, Presentations, Practical Exam					
Reference Material:					
1. Data Structures and Algorithms in Java: A Project-Based Approach by Dan S. Myers, Year 2024, ISBN-13: 978-1009260336					
2. Data Structure and Algorithms in C++ by Adam Drozdek, 4th Edition, ISBN-13: 978-1133608424					
3. Data Structure and Algorithms in java by Adam Drozdek, 4th Edition, ISBN-13: 978-9814392785					
4. Data Structures and Algorithm Analysis in Java by Mark A. Weiss, 3rd Edition, ISBN-13: 978-0132576277					
5. Java Software Solutions: foundation of Program Design by John Lewis and Joseph Chase, 9th Edition, ISBN-13: 978-1292221724					