

THOMAS ADEWUMI UNIVERSITY, OKO-IRESE

Faculty	Computing and Applied Sciences
Department	Mathematical and Computing Science
Program	Computer Science
Course Code	CSC 204
Course Title	FUNDAMENTALS OF DATA STRUCTURES
Study Year	2
Credit Hours	3
Contact Hours	45
Pre-requisite	
Status	Required
Semester	First
Mode of Assessment	Lecture, Assessment and Practical
Mode of Delivery	<ul style="list-style-type: none">• Classroom Lectures• Laboratory Practical Sessions
Continuous Assessment Examination Total	30% 70% 100%
Course Lecturer and Instructor	Mr. Ayepetu Felix
Course Description	This course introduces students to the underlying principles of data structures and algorithms. It also helps to develop students' understanding of the basic concepts of object-oriented programming using C++. This course also provides practical knowledge and hands-on experience in designing and implementing data structures and algorithms and their manipulation. Topics to be covered include introduction to C++ programming language, pointers and arrays, classes, recursion, stacks, queues, lists, tables, trees, binary trees, search trees, heaps and priority queues; sorting, hashing, garbage collection, storage management; and the rudiments of the analysis of algorithms.
Course Objectives	<ul style="list-style-type: none">• To develop students' knowledge and understanding of the fundamental principles of data structures.• To develop students' skills in analyzing data structures.• To build up students' capacity to evaluate different algorithmic techniques.• To build up students' capacity to write programs for developing simple applications.• To develop students' competence in analysing data structures.• To Build up students' capacity to write programmes for developing simple applications.

Learning Outcome	<ul style="list-style-type: none"> • describe the basic operations on arrays, lists, stacks and queue data structures. • explain the notions of hashing, trees and binary search trees. • describe the efficiency of algorithms with respect to the choice of data structures. • explain the basic concepts of object-oriented programming. • develop C++ programs for simple applications. • develop an efficient algorithm of a particular problem domain with respect to the choice of data structures • translate the algorithms to application written in C++ 	
Detailed course contents	Primitive types, Arrays, Records Strings and String processing, Data representation in memory, Stack and Heap allocation, Queues, TREES. Implementation Strategies for stack, queues, trees. Run time Storage management; Pointers and References, linked structures.	
Course Contents Sequencing		
Weeks	Detailed Course Outline	Allocated Time
WEEK 1	<ul style="list-style-type: none"> • introduction to vector and algorithm • Data structures: definition of basic terms (data types, abstract data types and data structure}. • Importance of data structures in computer programming 	3 Hours
WEEK 2	Types of data structure: linear and non-linear data structure; Array: declaration, classification, application of arrays	3 Hours
WEEK 3	List: operations, list implementation (array list, linked list), singly, doubly linked list, sorted list	6 Hours
WEEK 4 and 5	<ul style="list-style-type: none"> • Stack: operation, • static and dynamic • stacks, application of stacks C.A Test	6 Hours
WEEK 6 and 7	Queues: operations of queues, storing queues in static or dynamic data structures	6 Hours
WEEK 8 and 9	Trees: binary search trees, trees transversal (in-order, Post-order, and preorder) Common operations on a tree , application of trees in computer programming	6 Hours
WEEK 10 and 11	Hashing and hash table, garbage collection, storage management Analysis of algorithm , synergy between data structures and algorithm C.A Test	6 Hours
WEEK 12	Factors to be considered in the choice of data structures	3 Hours

	and algorithms	
	REVISION	
READING LIST:		
<ul style="list-style-type: none">• Hubbard, J.R. (2000). <i>Data Structures and Algorithms</i>,. McGraw-Hill,New Sc York, USA, 407p.• Lewis, H.R., Denenberg, L., (1991). <i>Data Structures and their Algorithms</i>. Published by Addison-Wesley, UK. 509p.• A Practical Introduction to Data Structures and Algorithm Analysis Third Edition (Java) Published by Clifford A. Shaffer• Data Structures in Java Data Structures in Java Laboratory College by Sandra Andersen Concordia College		