



**AMERICAN UNIVERSITY
OF CYPRUS**

Course Code CSC202	Course Name Data Structures and Algorithms	ECTS Credit 7.5
Pre-Requisite CSC102	Course Type Compulsory	Language of Instruction English
Year of Study 2 nd / 3 rd	Level of Course BSc/1st Cycle	Mode of Delivery On Campus

Course Objectives:

The course will introduce students to the basic concepts of data structures, as well as their usefulness in various computer functions. Structures such as tables, stacks, queues, linked lists, trees, and charts will be discussed and analyzed. Students will develop algorithms and learn to operate and handle these structures effectively. Finally, an analysis of the complexity of the spatial time of the algorithms will be presented.

Learning Outcomes

Upon completion of the course, students are expected to be able to:

- Analyze the program with time complexity and its expression with notation Oh, Omega and Theta.
- Classify and evaluate linear and nonlinear data structures.
- Solve computer problems using programs with abstract data structures.
- Solve computer problems by applying different algorithms.

Teaching Methodology:

Lectures 42 hours

Labs 30 hours

Course Content

Introduction and application of data structures

Definition and application of data structures

The definition of an algorithm, and the difference between an algorithm and a program

Program creation and analysis.

Asymptotic notation and numeric, O-notation.

Complexity of search and classification algorithms.

Retrospective mathematical function, a problem set up repeatedly

Mathematical induction

Comparison of iterative and retrospective solutions

Strategies divide and reign

Retrospective withdrawal

Linked lists:

Apply a linked list

Index on linked list

Import and delete on linked lists

Effectiveness of these functions and comparison of linked lists with successive storage structures

Algorithms for deleting and adding to linked lists

Stacks and queues:

Definition

Creating a Stack

Delete, return and add item from a stack

Algorithms for adding and deleting data from a stack.

Create a queue

Deleting the front tail item

Add item to the back of the queues.

Algorithms for deleting and adding queues

Sorting and searching:

$O(n^2)$ and $O(n \log n)$ sorting techniques

Linear and binary search, greedy and split and baseline algorithms

Fragmentation

Trees.

Theory of Graphs.

What a graph

What a path and a circuit

Directed and non-written

The breadth and depth

Graph search, graph representation graphs as abstract data structures.

Assessment Methods:

Final Exam

Mid-Term/Lab Exam

Assignments

Required Textbooks/Reading:

Title	Author(s)	Publisher	Year
Data Structures	E. Balagurusamy	Mc Graw Hill	2019
Introduction to JAVA programming and Data Structures	Lang Daniel	Pearson	2019