COURSE DESCRIPTIONS

Faculty	Science and Information Technology				
Department	**Computer science**			**NQF level**	6
Course Title	**Data structures**	**Code**	**501241**	**Prerequisite**	501221
Credit Hours	3 hours	**Theory**	2 h	**Practical**	1 h
Course Leader	Dr. Sami Qawasmeh	**email**	sqawasmeh@jadara.edu.jo		
Lecturers	Dr. Sami Qawasmeh	**emails**	sqawasmeh@jadara.edu.jo		
Lecture time	11:30 – 13:00 Mon,Wed	**Classroom**	Online		
Semester	First – 2021-2022	**Production**	20/6/2020	**Updated**	20/10/2021
Awards	B.S.			**Attendance**	Fulltime

Short Description
This course is to introduce students to various types of data structures, their logical and physical representations, and their related operations. Topics to be covered include: data structure, operations, lists and matrix representations, linked lists and their different variations, string storage representation and manipulation, queues and stacks and their applications, tree structures and their different variations, graphs and networks.

Course Objectives
The main objective of this course is to provide students with the theoretical background and practical experience relating to the design and implementation of several types of data structures. Students, during this course, are trained to deal with Abstract Data Types (ADT) and to implement different data structures using different methods. Also, Writing advanced programs which are based on arrays, structures, strings, lists, stacks, queues, hash tables and trees and recursion. In addition, selecting appropriate data structures for modeling a given problem.

Learning Outcomes

A. Knowledge - Theoretical Understanding
   a1. Define the basic concepts involved in structured problem solving and to design correct, appropriate and adequate Data structures with respect of time complexity.

B. Knowledge - Practical Application
   a2. Demonstrate the usage of pointers and new, delete operations to allocate and to de-allocate memory space dynamically, to use ->, &, * operators, and to access dynamic data correctly, and show how to use linked structure to solve basic application problems with insertion and deletion of a node anywhere in the list.

C. Skills - Generic Problem Solving and Analytical Skills

b1) Develop applications based on using different data structures to determine the appropriate data structure(s)

b2) Identify the advantages and disadvantages of specific algorithms and data structures.

D. Skills - Communication, ICT, and Numeracy

c1) Design the best solution by organizing material for problem-solving methods.

E. Competence: Autonomy, Responsibility, and Context

Teaching and Learning Methods

- Class lectures, lecture notes, homework assignments, and lab are designed to achieve the course objectives.

- You should read the assigned chapters before class, complete assignments on time, participate in class and do whatever it takes for you to grasp this material. Ask lots of questions.

- You should attend the 2 hours weekly lab that practice the theoretical material covered in the class.

- You are responsible for all material covered in the class and in the lab.

- Please check e-learning site regularly.

Assessment Methods

- Midterm Exam	30 %
- Assignments (Reports /Quizzes/ Seminar / Tutorials ….)	30 %
- Final Examination	40 %

Course Contents					
Week	**Hours**	**CLOs**	**Topics**	**Teaching & Learning Methods**	**Assessment Methods**
1,2	6	a: 1,2	• *Linear and Non - Linear Data Structures* • *Complex Structures (Arrays and Records), Array Based Structures.* • *One - and Multi-dimensional arrays and arrays of records.*	Online lectures, Program Examples	homework
3,4	6	b:1,2	• *Pointers Operators. Pointer Expressions and pointer arithmetic, Relation between pointers and Arrays.* • *Dynamic structures: Pointer Variable Definitions and Initialization, Dynamic memory allocation - Pointers and records.*	Online lectures, Program Examples	Quiz
5-8	12	a:1,2 b: 1,2 c: 1	• *Introduction, Implementation of Linked List , Linked List Vs. Arrays, Memory Allocation & De-allocation for a Linked List, Linked List operations(insertion, deleteion), Types of Linked List, and Application of Linkedlists.*	Online lectures, Program Examples	Homework Midterm Assignment
9,11	9	a:1,2 b: 1,2 c: 1	• *Linked list (double, Bidirectional, Circular)* • *Linked-list, operations and Applications on linked-list, sorted and unsorted linked-lists*	Online lectures, Program Examples	Homework Assignment
12,14	9	a:1,2 b:1,2 c: 1	• Stacks and Queues. Behavior of a Stack. Basic operations on a Stack. Linked-list based implementation. Expression evaluation using a stack. Queues. Behavior of a queue. Basic queue operations Study implementations using a linked-list. • *Queues- (Priority Queues), Double-Ended Queues, Circular Queues*	Online lectures, Program Examples	Quiz and assignment

Infrastructure	
Textbook	**D. S. Malik, "C++ Programming: Program Design Including Data Structures, 8th edition", 2018.**
References	**C++ How to program, H. M. Deitel and P. J. Deitel, Pearson India Education; 10th ed, 2017.**
Required reading	
Electronic materials	**Posted materials**
Other	**Handout materials**

Course Assessment Plan						
Assessment Method	**Grade**	**CLOs**				
		a1	a2	b1	b2	c1
First (Midterm)	30	12	10	8	-	-
Second (if applicable)	-	-	-	-	-	-
Final Exam	50	8	10	10	10	12
Coursework	20					
Coursework assessment methods — Assignments	5		5			
Case study						
Discussion and interaction						
Group work activities						
Lab tests and assignments						
Presentations						
Quizzes	15	8		7		
Total	100	25	25	23	10	17

Plagiarism
Plagiarism is claiming that someone else's work is your own. The department has a strict policy regarding plagiarism and, if plagiarism is indeed discovered, this policy will be applied. Note that punishments apply also to anyone assisting another to commit plagiarism (for example by knowingly allowing someone to copy your code).   Plagiarism is different from group work in which a number of individuals share ideas on how to carry out the coursework. You are strongly encouraged to work in small groups, and you will certainly not be penalized for doing so. This means that you may work together on the program. What is important is that you have a full understanding of all aspects of the completed program. In order to allow proper assessment that this is indeed the case, you must adhere strictly to the course work requirements as outlined above and detailed in the coursework problem description. These requirements are in place to encourage individual understanding, facilitate individual assessment, and deter plagiarism.