COURSE DESCRIPTIONS

Faculty	Science and Information Technology				
Department	Computer Science			**NQF level**	6
Course Title	Algorithm Design and Analysis	**Code**	501292	**Prerequisite**	501291
Credit Hours	3	**Theory**	3	**Practical**	0
Course Leader	Dr. Arwa Zabian	**email**	arwa@jadara.edu.jo		
Lecturers	Dr. Arwa Zabian	**emails**	azabian@hotmail.com		
Lecture time	11.30-1.00 sun-tue	**Classroom**	Face to face learning		
Semester	Second	**Production**	2020	**Updated**	2021-2022
Awards	Bachelor Degree			**Attendance**	Fulltime

Short Description
This course introduces the basic concepts and methods used in the design and analyze of the algorithms. Algorithm design is a specific method to create a mathematical process in solving problem. At the end of this course, the student must be able to design an algorithm (or more than one) to solve any proposed problem using flow chart and pseudo code. Then, he must be able to analyze it and to find the most efficient solution. Algorithm analysis means determining the amount of resources necessary to execute it. Resources mean time and space. This course allows the student to calculate the amount of time and space needed to execute each instruction of an algorithm, compare the cost of different types of instructions, and calculate the total time of execution. Given that, he must be able to distinguish between efficient and non-efficient algorithm. Based on this comparison the student will learn about the complexity (easy, hard), and the computability of the problem (solvable or not).
Course Objectives
Upon completion of this course, students should be able to: Understand what means an algorithm Design and analyze an algorithm Find and algorithmic solution to some problems

Learning Outcomes
A. Knowledge - Theoretical Understanding
a1: Define the algorithm, and classify data structure (hash table , binary search tree) based on their functions (K1)
B. Knowledge - Practical Application
a2: Select the best sorting/ searching used algorithm for any problem (K5)
C. Skills - Generic Problem Solving and Analytical Skills
b1: Make use of logical reasoning for a problem solution (algorithm design) (S1)

b2: Apply algorithms analysis tools (S2)
D. Skills - Communication, ICT, and Numeracy
E. Competence: Autonomy, Responsibility, and Context
Teaching and Learning Methods
Face to face learning
Assessment Methods
By quizzes, home works and exams

Course Contents					
Week	**Hours**	**CLOs**	**Topics**	**Teaching & Learning Methods**	**Assessment Methods**
1, 2	6	a1, a2, b1	**Algorithm Design** • problem solving • flow chart • data type **Algorithm Design** • control structure writing algorithms	Face to face learning	quiz
3,4	6	b2	**Algorithm Comparison** • measuring the efficiency of the algorithms • analyzing algorithms insertion sort	Face to face learning	quiz
5,6	6	b2	**Analyzing algorithms** • best worst, average case • sequential search algorithm • divide and conquer • Merge sort	Face to face learning	assignment
7	3	a1,a2, b2	**Algorithm efficiency** • Order of Growth • Binary search algorithm	Face to face learning	quiz
8	1.5	a2	**Sorting algorithms** Quicksort	Face to face learning	
	1.5	a1,a2, b1,b2	**Mid Exam**		Mid Term
9, 10	6	a1,a2	Heap sort	Face to face learning	quiz
11 12	6	a1	Hash table	Face to face learning	quiz
13	3	a1	Binary search tree	Face to face learning	

14 15	6	a1, b1	Graph search algorithms (BFS, DFS), Dijkstra	Face to face learning	
16	2	a1, a2, a3, b1	Final exam	Face to face exam	Final exam

Infrastructure	
Textbook	**Introduction to Algorithms,** Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest. The MIT Press/ Cambridge, Massachusetts London-England. 2022, 4th edition
References	**ISBN-10:** 0262033844
Required reading	The Algorithm Design Manual (Texts in Computer Science) 3rd ed. 2020 Edition, Steven S. Skiena. ISBN-13 : 978-3030542559
Electronic materials	**Textbook Available on : http://elearning.jadara.edu.jo/CourseContent/index/9552/**
Other	

Assessment Method		**Grade**	**a1**	**a2**	**b1**	**b2**	
First (Midterm)		30	5	10	5	10	
Second (if applicable)							
Final Exam		50	20	10	10	10	
Coursework		20					
Coursework assessment methods	Assignments						
	Case study						
	Discussion and interaction						
	Group work activities						
	Lab tests and assignments						
	Presentations						
	Quizzes	20	5	5	5	5	
Total		100	30	25	20	25	

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.