

COURSE DESCRIPTIONS

Faculty	Information Technology				
Department	Computer Science	NQF level	7		
Course Title	Algorithm Design and Analysis	Code	501292	Prerequisite	501291
Credit Hours	3	Theory	3	Practical	0
Course Leader		email			
Lecturers	Dr. Sami Gawasmeh Dr. Hassan AlSarhan Dr. Abeer Malkawi	emails	sgawasmeh@jadara.edu.jo ad.malkawi@jadara.edu.jo		
Lecture time		Classroom	Face to face learning		
Semester	First 2025-2026	Production	2020	Updated	2024
Awards	Bachelor's degree			Attendance	Fulltime
Type of Teaching	<input checked="" type="checkbox"/> Face to Face <input type="checkbox"/> Blended <input type="checkbox"/> Online				

Short Description

This course introduces the basic concepts and methods used in the design and analysis of the algorithms. Algorithm design is a specific method to create a mathematical process in solving problems. 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 number 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 algorithms. 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 an algorithm means
- Design and analyze an algorithm
- Find and algorithmic solutions 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: <u>Select</u> the best sorting/ searching used algorithm for any problem (K5)
C. Skills - Generic Problem Solving and Analytical Skills
b1: <u>Make use of</u> logical reasoning for a problem solution (algorithm design) (S1) b2: <u>Apply</u> algorithms via analysis tools (S2)
D. Skills - Communication, ICT, and Numeracy
E. Competence: Autonomy, Responsibility, and Context
c1: Choose the effective data structure/algorithms that should be used to design a solution. (C1)
Teaching and Learning Methods
Face to face learning
Assessment Methods
By quizzes, homework and exams

Course Contents					
Week	Hours	CLOs	Topics	Teaching & Learning Methods	Assessment Methods
1,2	6	a1, a2, b1	Algorithm Design <ul style="list-style-type: none"> • Problem solving • Flow chart Algorithm Design <ul style="list-style-type: none"> • Control structure • Writing algorithms 	Face to face learning	Quiz
3,4	6	b2	Algorithm Efficiency <ul style="list-style-type: none"> • Measuring the efficiency of the algorithms • Analyzing algorithms • Asymptotic Notations • Order of Growth 	Face to face learning	
5	1.5	a2, b2	Analyzing Algorithms <ul style="list-style-type: none"> • Sequential search algorithm • Binary search algorithm 	Face to face learning	Quiz
5, 6	4.5	a2, b2	Sorting algorithms <ul style="list-style-type: none"> • Insertion sort algorithm • Divide and conquer • Merge sort 	Face to face learning	Quiz
7	3	a2, b2	Sorting algorithms <ul style="list-style-type: none"> • Quicksort 	Face to face learning	
8	1.5	a1, a2, b1, b2	Mid Exam		Mid Term
9	3	a1, b2, c1	Graphs, Trees & Heaps	Face to face learning	
10	3	a1, b2, c1	Binary search tree	Face to face learning	Quiz
11	3	a1, b2, c1	Hash table	Face to face learning	

12, 13	6	a1, b2, c1	Graph search algorithms <ul style="list-style-type: none"> • Dijkstra • A* 	Face to face learning	Quiz
14	2	a1, a2, b1, b2, c1	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, 4 th 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	Grade				
			a1	a2	b1	b2	c1
First (Midterm)		30	10	10	5	5	
Second (if applicable)							
Final Exam		50	10	10	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	25	25	20	15	15

Plagiarism
<p>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).</p> <p>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.</p>