Faculty: Information Technology

Department: Computer Science Program: Master

Academic year:2023/2024

Semester:1st



Course Plan

First: Course Information

<i>Course No.:</i> 1501751	Course Title: Applied Algorithms		Credit Hours:3		
Prerequisite No.:	Section No.: 1		<i>Lecture Time:</i> 12-15 <i>Saturday</i>		
	□Obligatory University Requirement		lective University Requirement		
Type Of Course:	Obligatory Faculty Requirement		ective Faculty Requirement		
	Obligatory Specialization Requirement]Ele	ective Specialization Requirement		
	■Face-to-Face Learning				
Type of Learning:	Blended Learning (2 Face-to-Face + 1Asynchronous)				
	□Online Learning (2 Synchronous+1 Asynchronous)				

Second: Instructor's Information

Name: Dr. Raed Alazaidah				Academic Rank: Assistant Prof.	
Office Number:238B Phone Number:1509			Email: razaidah@zu.edu.jo		
Office Hours:	Satı 11-1	urday Sunday 2 9-10	Monday 9-10	Tuesday 9-10	Wednesday Thursday 11-12

Third: Course Description

It is intended to teach algorithms for solving real and advanced problems that arise frequently in computer applications. Moreover, the course intends to discuss various applications of algorithms in several domains especially machine learning, cyber security, and data science.



Fourth: Learning Resources

Main Reference:	Introduction to Algorithm			
Author: Cormen, Lei Stein	Leiserson, Rivest, Issue No.: 3 ^{ed} edition Publication Year: 2009			
Additional Sources &Websites:	 Jeffrey J. McConnell, "Analysis of Algorithms: An Active Learning Approach", Second Edition, Jones & Bartlett, 2008. Richard Neopolitan and KumarssNaimipour, "Foundations of Algorithms", Fourth Edition Jones & Bartlett 2011 			
Teaching Type:	Classroom	Laboratory 🗆 Workshop 🗆	MS Teams 🔳 Moodle	

Fifth: Learning Outcomes

CILO Code	Course Intended Learning Outcomes (CILOs)	Connection To Program ILOs Code			
	Knowledge				
**K1	Concepts and Theories: Know and understand basic terms associated with algorithms; such as time and space complexities, Big O notation, Big Omega notation, Big Theta notation, etc. Understand the algorithms analysis criteria.	*PK1			
K2	Contemporary Trends, Problems and Research: Apply the algorithms and design techniques to solve modern problems	PK2			
K3	Professional Responsibility: Understand principles, concepts, and algorithms of practical problems	РК3			
	Skills				
***S1	Problem solving skills: Prove the correctness and analyze the running time of the basic algorithms for those classic problems in various domains;	PS1			
S2	Modeling and Design: Design various sorting algorithms using sequential and divide-and- conquer approaches, design various searching algorithms, and design various minimum spanning tree algorithms using greedy approach.	PS2			
S3	Application of Methods and Tools: Convert the algorithms to code using a programming language such as JAVA.	PS3			
S4	General and Transferable Skills - Communication: Be able to discuss the strengths and limitations of algorithm applications in solving problems.	PS4			
S5	General and Transferable Skills Teamwork and Leadership Be able to communicate effectively in a group	PS5			



Competences				
****C1	Critical-Thinking Skills - Analytic skills: Assess Analyze and evaluate various sorting algorithms, analyze and evaluate various searching algorithms, analyze and evaluate various minimum spanning tree algorithms. Analyze the complexities of various problems in different domains.	PC1		
C2	Strategic Thinking: Greedy and/ or dynamic programming strategy	PC2		
C3	Creative thinking and innovation: Solve the problems by using new techniques	PC3		
****C1	Critical-Thinking Skills - Analytic skills: Assess Analyze and evaluate various sorting algorithms, analyze and evaluate various searching algorithms, analyze and evaluate various minimum spanning tree algorithms. Analyze the complexities of various problems in different domains.	PC1		
C2	Strategic Thinking: Greedy and/ or dynamic programming strategy	PC2		

* P: Program, **K: knowledge, ***S: skills, ****C: competencies.

Sixth: Course Structure

Lecture Date	Intended Learning Outcomes ILOs	Topics	Teaching Procedures*	Teaching Methods**	References***
Week1 21/10/2023	K1	Course Syllabus discussion	Face- to-Face	Lecture	Slides on the Moodle
	K1, K2, K3, S3 S5	Introduction to Algorithms	Face- to-Face	Lecture	Slides on the Moodle
	K1, K2, K3, S3 S5	Introduction to Algorithms	Face- to-Face	Lecture	Slides on the Moodle
Week2	K1, K2, K3, S3 S5	Insertion sort	Face- to-Face	Lecture	Slides on the Moodle
20/10/2023	K1, K2, K3, S3 S5	Pseudocode Conventions	Face- to-Face	Lecture	Slides on the Moodle
	K1, K2, K3, S3 S5	Analyzing Insertion sort	Face- to-Face	Lecture	Slides on the Moodle
	K1, K2, K3, S3 S5	Best and Worst case	Face- to-Face	Lecture	Slides on the Moodle
	K1, K2, K3, S3 S5	Order of growth	Face- to-Face	Lecture	Slides on the Moodle
	K1, K2, K3, S3 S5	Merge sort	Face- to-Face	Lecture	Slides on the Moodle
	K1, K2, K3, S3 S5	Analyzing merging sort	Face- to-Face	Lecture	Slides on the Moodle
Week3 4/11/2023	K1, K2, K3, S3 S5	Divide and conquer	Face- to-Face	Lecture	Slides on the Moodle
1,11,2023	K1, K2, K3, S3 S5	Quick sort	Face- to-Face	Lecture	Slides on the Moodle



	K1, K2, K3, S3	Binary search	Face- to-Face	Lecture	Slides on the Moodle
	K1, K2, K3, S3 S5	Maximum sub-array problem	Face- to-Face	Lecture	Slides on the Moodle
Week4	K1, K2, K3, S3 S5	Sorting Algorithms	Face- to-Face	Lecture	Slides on the Moodle
11/11/2023	K1, K2, K3, S3 S5	Heap sort	Face- to-Face	Lecture	Slides on the Moodle
	K1, K2, K3, S3 S5	Priority queues	Face- to-Face	Lecture	Slides on the Moodle
	K1, K2, K3, S3 S5	Counting sort	Face- to-Face	Lecture	Slides on the Moodle
	K1, K2, K3, S3 S5	Radix sort	Face- to-Face	Lecture	Slides on the Moodle
Week5	K1, K2, K3, S3, C1, C2, C3, S5	Greedy algorithms	Face- to-Face	Lecture	Slides on the Moodle
10,11,2020	K1, K2, K3, S3, C1, C2, C3, S5	Activity selection problem	Face- to-Face	Lecture	Slides on the Moodle
	K1, K2, K3, S3, C1, C2, C3, S5	Knapsack problem	Face- to-Face	Lecture	Slides on the Moodle
	K1, K2, K3, S3, C1, C2, C3, S5	Minimum spanning tree	Face- to-Face	Lecture	Slides on the Moodle
Week6	K1, K2, K3, S3, C1, C2, C3, S5	Dynamic Programming	Face- to-Face	Lecture	Slides on the Moodle
23/11/2023	K1, K2, K3, S3, C1, C2, C3, S5	Fibonacci series	Face- to-Face	Lecture	Slides on the Moodle
	K1, K2, K3, S3, C1, C2, C3, S5	Fibonacci series	Face- to-Face	Lecture	Slides on the Moodle
	K1, K2, K3, S3, C1, C2, C3, S5	Rod cutting problem	Face- to-Face	Lecture	Slides on the Moodle
	K1, K2, K3, S3, C1, C2, C3, S5	Rod cutting problem	Face- to-Face	Lecture	Slides on the Moodle
	K1, K2, K3, S3, C1, C2, C3, S5	Longest common subsequence	Face- to-Face	Lecture	Slides on the Moodle
	K1, K2, K3, S3, C1, C2, C3, S5	Longest common subsequence	Face- to-Face	Lecture	Slides on the Moodle
Week7	K1, K2, K3, S3, C1, C2, C3, S5	Graph algorithms	Face- to-Face	Lecture	Slides on the Moodle
2/12/2023	K1, K2, K3, S3, C1, C2, C3, S5	Graph algorithms	Face- to-Face	Lecture	Slides on the Moodle
	K1, K2, K3, S3, C1, C2, C3, S5	Graph algorithms	Face- to-Face	Lecture	Slides on the Moodle
Midterm Exam 3/12/2023 – 14/12/2023					
Week8 9/12/2023	K1, K2, K3, S3, C1, C2, C3, S5	Applications of Algorithms in ML	Face- to-Face	Lecture	Slides on the Moodle
<i>y</i> , 12 , 2 020	K1, K2, K3, S3, C1, C2, C3, S5	Tutorial WEKA+KEEL	Face- to-Face	Lecture	Slides on the Moodle
Week9 16/12/2023	K1, K2, K3, S3, C1, C2, C3, S5	Applications of ML algorithms in Medical Domain	Face- to-Face	Lecture	Slides on the Moodle
Week10 23/12/2023	K1, K2, K3, S3, C1, C2, C3, S5	Applications of ML algorithms in Cyber Security	Face- to-Face	Lecture	Slides on the Moodle



Week11 30/12/2023	K1, K2, K3, S3, C1, C2, C3, S5	Data Science Algorithms	Face- to-Face	Lecture	Slides on the Moodle
Week12 6/1/2024	K1, K2, K3, S3, C1, C2, C3, S5	Students Presentations	Face- to-Face	Lecture	Slides on the Moodle
Week13 13/1/2024	K1, K2, K3, S3, C1, C2, C3, S5	Students Presentations	Face- to-Face	Lecture	Slides on the Moodle
Final Exam 21/1/2024-1/2/2024					

* Teaching procedures: (Face-to-Face, synchronous, asynchronous). * * Teaching methods: (Lecture, video....). ** * Reference: (Pages of the book, recorded lecture, video....).

Seventh: Assessment Methods

Methods	Online Learning	Blended Learning	Face-To-Face Learning	Measurable Course (ILOs)
First Exam				
Second Exam				
Mid-term Exam			35	
Participation			15	
Asynchronous Activities				
Final Exam			50	

Eighth: Course Policies

- All course policies are applied to all teaching patterns (online, blended, and face-to-face Learning) as follows:
 - a. Punctuality.
 - b. Participation and interaction.
 - c. Attendance and exams.
- Academic integrity: (cheating and plagiarism are prohibited).

Approval	Name	Date	Signature
Head of Department			
Faculty Dean	Prof. M. Hassan		

