



Course Specifications

Course Title:	Algorithm Design and Analysis
Course Code:	CS 334
Program:	Computer Science
Department:	Computer Science
College:	College of Computer and Information Sciences
Institution:	Majmaah University



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A. Course Identification

1. Credit hours:	3 (3,0,1)
2. Course type	
a.	University <input type="checkbox"/> College <input checked="" type="checkbox"/> Department <input type="checkbox"/> Others <input type="checkbox"/>
b.	Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered:	Level 9
4. Pre-requisites for this course (if any):	CS 231
5. Co-requisites for this course (if any):	N.A.

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	44	100%
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	33
2	Laboratory/Studio	
3	Tutorial	11
4	Others (specify)	
	Total	44

B. Course Objectives and Learning Outcomes

1. Course Description

This course introduces the several fundamental principles of algorithm design and analysis. This course gives a broad look on Asymptotic notations, divide-and-conquer design approaches, fast sorting, searching techniques using algorithms and multiplication. Graphs, shortest paths are also introduced here.

2. Course Main Objective

The course aims to enables the students to asymptotic notations, divide-and-conquer design approaches, fast sorting and searching algorithms. The students study the fundamental algorithms on graphs, such as how to find shortest paths, and how to explore graphs.



3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding	
1.1	CLO1- Students will understand fundamental computer algorithms and will learn how to analyze them using basic techniques	K1
1.2	CLO2- Students will understand, compare and analyze the primary sorting and searching algorithms	K1
1.3	CLO4- Students will understand, compare and analyze the graph processing algorithms	K1
2	Skills :	
2.1	CLO3-Students will recognize problems where dynamic programming is an appropriate solution method and will be able to apply it	S1
2.2	CLO5- Students will apply the algorithmic complexity principles in the design of programs	S2
3	Values:	
3...		

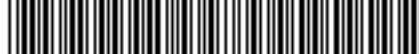
C. Course Content

No	List of Topics	Contact Hours
1	Introduction to Algorithms	4
2	Asymptotic Analysis	4
3	Divide & Conquer Algorithms (Mergesort, Quicksort, Heapsort, Recurrences, Master Theorem)	8
4	Linear Time Algorithms	8
5	Data Structures (BST, Red-Black Trees)	4
6	Dynamic Programming & Greedy Algorithms	6
7	Graph Algorithms (Graph implementation, BFS, DFS, MST, Dijkstra's Algorithm, Prim's Algorithm)	8
8	NP-Completeness	2
Total		44

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	Knowledge and Understanding		
1.1	CLO1- Students will understand fundamental computer algorithms and will learn how to analyze them using basic techniques	Classroom Lectures Group Discussions Tutorial Classes	Homework Assignments Quizzes, Mid exam Final Exam



Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.2	CLO2- Students will understand, compare and analyze the primary sorting and searching algorithms	Classroom Lectures Group Discussions Tutorial Classes	Homework Assignments Quizzes, Mid exam Final Exam
1.3	CLO4- Students will understand, compare and analyze the graph processing algorithms	Classroom Lectures Tutorial Classes	Assignment Final Exam
2.0	Skills		
2.1	CLO3-Students will recognize problems where dynamic programming is an appropriate solution method and will be able to apply it	Classroom Lectures Group Discussions Lab demonstrations Tutorial Classes	Assignments Lab Exercise
2.2	CLO5- Students will apply the algorithmic complexity principles in the design of programs	Classroom Lectures Group Discussions Lab demonstrations Tutorial Classes	Homework Assignments Final Exam
3.0	Values		
3.1			

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Home Assignments	Week 13	10%
2	Class Test 1	Week 4	10%
3	Mid-Exam	Week 8	20%
4	Class Test2	Week 12	10%
5	Lab assignments/mini project	Week 14	10%
6	Final Exam	Week 16	40%

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

Every faculty will be assigned a number of students in the corresponding department for academic advising. Students can meet the faculty during advising hours or whenever the faculty is in the office during the specified office hours.

F. Learning Resources and Facilities



1. Learning Resources

Required Textbooks	Introduction to Algorithms, Cormen, Leiserson, Rivest, And Stein, 3rd Edition, Mit Press, 2009
Essential References Materials	<ul style="list-style-type: none"> • Introduction to The Design and Analysis of Algorithms. Ananyevitin, Pearson Education, 3rd Edition, 2011. • Introduction to Design & Analysis of Algorithms, Anany Levitin, Addison Wesley, 2011. • Foundations of Algorithms (4e). Richard E. Neapolitan And Kumarssnaimipour, " Jones And Bartlett, 4th Edition, 2009.
Electronic Materials	
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom and Laboratories, as those that are available at the college of Computer and Information Science.
Technology Resources (AV, data show, Smart Board, software, etc.)	Data show, Smart board, Internet Access
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Final Exam assessment	Peers	Verification of Marks
Course Report Verification	Quality Coordinator	Check List

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	