



Course Specification

— (Bachelor)

Course Title: **CS334**

Course Code: **Design and Analysis of Algorithms**

Program: **Computer Science**

Department: **Computer Science**

College: **College of Computer and Information Sciences**

Institution: **Majmaah University**

Version: **2**

Last Revision Date: **31 May 2023**



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A. General information about the course:

1. Course Identification

1. Credit hours: 3(3,0,1)

2. Course type

A. University College Department Track Others
 B. Required Elective

3. Level/year at which this course is offered: (7)

4. Course general 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.

5. Pre-requirements for this course (if any):

CS231 Data Structures

6. Pre-requirements for this course (if any):

7. Course Main Objective(s):

This course introduces students to asymptotic notations, divide-and-conquer design approaches, fast sorting, searching, and multiplication. Fundamental algorithms on graphs, such as how to find shortest paths, and how to explore graphs.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	E-learning		
3	Hybrid		



No	Mode of Instruction	Contact Hours	Percentage
	<ul style="list-style-type: none"> Traditional classroom E-learning 		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	45
2.	Laboratory/Studio	
3.	Field	
4.	Tutorial	15
5.	Others (specify)	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1				
1.2				
...				
2.0	Skills			
2.1	CLO1- Students will understand fundamental computer algorithms and will learn how to analyze them using basic techniques	S1	Classroom teaching	Assignments, Mid Exam, Final Exam, Indirect-CLO Survey
2.2	CLO2- Students will understand, compare and analyze the primary sorting	S2	Classroom teaching	Assignments, Mid Exam, Final Exam, Indirect-CLO Survey



Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	and searching algorithms			
2.3	CLO3-Students will recognize problems where dynamic programming is an appropriate solution method and will be able to apply it	S2	Classroom teaching	Assignments, Mid Exam, Final Exam, Indirect-CLO Survey
2.4	CLO4- Students will understand, compare and analyze the graph processing algorithms	S1	Classroom teaching	Assignments, Mid Exam, Final Exam, Indirect-CLO Survey
2.5	CLO5- Students will apply the algorithmic complexity principles in the design of programs	S4[CS]	Classroom teaching	Assignments, Mid Exam, Final Exam, Indirect-CLO Survey
3.0	Values, autonomy, and responsibility			
3.1				
3.2				
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to Algorithms	6
2.	Asymptotic Analysis	6
3.	Recurrence Relations, Master Theorem	6
4.	Sorting Algorithms	8
5.	Merge Sort, Quick Sort and Heap Sort-Divide and Conquer Algorithm	8
6.	Linear Time Algorithm	6
7.	Dynamic Programming and Greedy Algorithms	8





8.	Graphs	6
9.	Minimum Spanning Trees	6
10.	Dijkstras Shortest Path Algorithm	6
11.	Review	4
Total		

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes	3 and 12	20%
2.	Assignments and Homework	7 and 11	20%
3.	Mid Term Exam	8	20%
4.	Final Exam	16	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Introduction to Algorithms, Cormen, Leiserson, Rivest, And Stein, 3rd Edition, Mit Press, 2009.
Supportive References	<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, Ananyevitin, Addison Wesley, 2011. • Foundations of Algorithms (4e). Richard E. Neapolitan And Kumarsnaimipour, " Jones And Bartlett, 4th Edition, 2009.
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Class Room, PC
Technology equipment (projector, smart board, software)	LCD Projector, Dev C++/Visual studio C++



Items	Resources
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student	Indirect
Effectiveness of Students assessment	Instructor	Direct
Quality of learning resources	Instructor	Direct
The extent to which CLOs have been achieved		
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

