Hashemite University
College of Engineering
Department of Computer Engineering
Algorithms
(3 Credit Hours/Dept. Compulsory)

Instructor

Dr. Khalil Yousef	
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Office hours:	Posted on the course Moodle page

Grading info

One Midterm Exams	30%
Assignments and Quizzes	30%
Final	40%

Class Info

Days	Sec1: Mon/Wed
Time	Sec1: 8:00-09:30 AM
Location	E-2008

Course

Course Number:	110408343
Prerequisite:	Discrete Math (110101152), Data Structure (110408213)
Textbook:	**" Introduction to Algorithms"**, 3rd edition by Cormen, Leiserson, Rivest, and Stein. The MIT Press. ISBN # 978-0262033848 (2009, Fifth print).
Course Description:	This course is an introductory course to the design, implementation and analysis of computer algorithms. Topics covered include but not limited to the growth of functions, the time complexity of algorithms, recurrence relations and their solutions, the design and analysis of various sorting algorithms (insertion, merge, quick, and heap sort), linear sorts, search and hash tables, graph searching algorithms (breadth-first and depth-first search), dynamic programming, greedy algorithms, minimal spanning trees, single-source shortest path algorithms, and NP completeness (time allows).
Specific Outcomes of Instruction (Course Learning Outcomes)	1. **Provide** fundamental knowledge regarding the design and analysis of computer algorithms and learn how to prove the correctness of algorithms. SO's (1, 2, 4) 2. **Provide** tools to predict, analyze and compare the performance of algorithms (space and time). SO's (1, 2) 3. **Demonstrate** a familiarity with major algorithms and data structures. SO's (1, 4) 4. **Apply** important algorithmic design paradigms and methods of analysis. SO (1) 5. **Emphasize** classes of problems that can be solved by computers. SO (1)
Important material	- Lecture notes - References - Internet resources

References:

- **"Computers and Intractability, A Guide to the Theory of NP-Completeness"**, Garey and Johnson, Freeman, 1979

Major Topics Covered and Schedule in Weeks:

Topic	# Weeks	# Contact hours*
Introduction, Analyzing Algorithms, and Insertion Sort	1	3
Growth of Functions (Asymptotic analysis)	1	3
Merge Sort and Summations	1	3
Recurrences and Master Theorem	1	3
Heapsort and Quicksort	2	6
Linear Sorts: Sorting in Linear Time	1	3
Search and Hash Tables	1	3
Binary Search Tree + 2-3 trees	1	3
Elementary Graph Algorithms (BFS, DFS, Topological Sort)	1	3

Primitive Introduction to Dynamic Programming and Greedy Algorithms	1	3
Minimum Spanning Trees	1	3
Single-Source Shortest Paths	1	3
NP Completeness	1	3
Total	**14**	**42**

Course Policy

- The course will follow selected subjects as listed on the course schedule. Additional lecture notes and examples will be given and discussed in class as much as time permits.
- Course Website (Moodle): http://www.mlms.hu.edu.jo/. Students are asked to check the website regularly for announcements.
- Students are responsible for the reading assignments from the text and handouts
- Students are responsible for following up the lecture materials
- Students are responsible for reading additional information and examples in order to understand the materials discussed in the lectures.
- If you miss class, there won't be a makeup test, quiz, etc. and you WILL get a zero unless you have a valid excuse.
- Cheating and plagiarism are completely prohibited.
- If you miss more than 15% of classes you will automatically fail the class.
- The following grading scale will be applied to each student accumulated course metric values:
  100% - 90% A+, 90% - 85% A, 85% - 80% A-, 80% - 75% B+, 75% - 72% B, 72% - 68% B-, 68% - 65% C+, 65% - 60% C, 60% - 55% C-, 55% - 50% D+, 50% - 45% D, 45% - 0% F

ABET Student Outcomes (SO) Addressed by the Course:

#	***Outcome Description***	***Contribution***
General Engineering Student Outcomes		
(1)	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. *(Previously SO's (a, e, k))*	***H***
(2)	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors. *(Previously SO's (c, k))*	***L***
(3)	An ability to communicate effectively with a range of audiences. *(Previously SO (g))*	
(4)	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts. *(Previously SO's (f, h, j))*	***L***
(5)	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives. *(Previously SO (d))*	
(6)	an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions. *(Previously SO's (b, k))*	
(7)	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies. *(Previously SO (i))*	

H=High, **M**= Medium, **L**=Low

Prepared By: Dr. Khalil Yousef **Date: 20/09/2020**