الجامعـــــــــة الهاشـــميـــــــــة
كلية الاميـر الحسين بـــــن عبدالله الثاني لتكنولوجيا المعلـــومات



The Hashemite University
Prince Al-Hussein Bin Abdullah II Faculty for Information Technology
Department of Computer Scinece and Applications
Course Syllabus
Spring Semester 2021-2022



Syllabus*: Algorithms (: 151001351)
First/Second Semester 2021 /2022

COURSE INFORMATION	
Course Name: Algorithms **Semester:** Spring **Department:** Department of **Faculty: Prince Al-Hussein Bin Abdullah II Faculty for Information Technology**	**Course Code:** 151001351 **Section:** 1,2,3 **Core Curriculum**:
Day(s) and Time(s): **Section 1: 9:00-10:00** **Section 2: 10:00-11:00** **Section 3:11:00-12:00** **Classroom:** IT302	**Credit Hours:** 3 **Prerequisites**: 151001250

COURSE DESCRIPTION

The course gives a broad introduction the design and analysis of computer algorithms. General topics to be covered include growth of functions, recurrences, sorting, divide-and-conquer, various data structures, dynamic programming, greedy algorithms, graph searching and graph algorithms, flow networks, bipartite matching, NP-completeness, and parallel algorithms.

DELIVERY METHODS

The course will be delivered through a combination of active learning strategies. These will include:

- PowerPoint lectures and active classroom based discussion
- YouTube channel
- E-learning resources: e-reading assignments and practice quizzes through Model and Microsoft Team

FACULTY INFORMATION

Name	**Sahar Idwan**
Academic Title:	**Professor**
Office Location:	**IT**
Telephone Number:	
Email Address:	**sahar@hu.edu.jo**

Office Hours:	**Sunday:8:15-9:00** **Tuesday :1:00-2:00** **Monday: 10:00-11:00** *Please send an e-mail (sahar@hu.edu.jo) to meet at any other time.*

REFERENCES AND LEARNING RESOURCES

Required Textbook:

Thomas Cormen, Charles Leiserson, Ronald Rivest, and Cliffor Stein, "Introduction to Algorithms", 3rd edition, MIT press 2009

Suggested Additional Resources:

- Richard Johnsonbaugh, and Marcus Schaefer, Algorithms, 1st edition, Pearson edition, 2004.
- Sara Baase, and Allen Van Gelder, Computer algorithms, Introduction to design and analysis" , 3rd edition , Addison Wesley, 2000.
- Anany Levitin, Introduction to the Design and Analysis of Algorithms, 2nd edition, Pearson International Edition
- Jon Kleinberg and Eva Tardos, Algorithm Design, 1st edition, Pearson International Edition, 2006

Useful Web Resources: https://www.youtube.com/channel/UCX6LVcAv_vqbfVNIlyVGnlw

STUDENT LEARNING OUTCOMES MATRIX*

Core Curriculum Learning Outcomes	Program Learning Outcomes	Course Objectives	Course Student Learning Outcomes	Assessment Method
	SLO #1 Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.	Understand the covered algorithms and algorithmic techniques.	1. Identify and characterize the algorithmic techniques	• Exams • Quizzes
		Discuss the correctness and analyze the running time of a given algorithm.	2. Describe behavior of functions in the limit	• Exams • Quizzes • "On-line' reading • assignments
		Understand how searching algorithms such as BSTs and red-black trees are implemented.	3.1 Understand the different ways to represent the data 3.2 Understand the importance to represent the data by using different structures such as binary search tree and the Red black tree	• Exams • Quizzes • homework
	SLO #2 Design, implement, and evaluate a computing-based solution to meet a given set of	Discuss the correctness and analyze the running time of a given algorithm.	Compute the complexity of different algorithms	• Exams • Quizzes
		Understand how searching algorithms	Determine the best case and the worst case for different operations by using	• Exams • Quizzes

	computing requirements in the contet of the programs discipline.	such as BSTs and red-black trees are implemented.	different data structures such Binary search tree and Red Black tree	
		Analyze different sorting algorithms such as heap sort and merge sort.	Describe the comparison-based algorithm such heapsort Determine the space and the time needed to run the heapsort and the merge sot algorithms	• Exams • Quizzes
		Define the concepts of dynamic programming and apply them to solve specific problems.	Describe the details of the dynamic programming technique. Describe the overlapping subproblems and the optimal substructure property.	• Exams • Quizzes • Assignments
		Define the concepts of greedy algorithms and apply them to solve specific problems.	Describe the details of the greedy algorithms Discuss the different examples that run by using greedy algorithms such Activity selection problem and the knapsack problem	• Exams • Quizzes • Assignments
		Understand how graph algorithms are implemented.	Describe the basic idea of graph Describe the graph in data structure Describe the different types in data structure Describe the representations of graphs Describe the graph traversal Algorithms	• Exams • Quizzes • Assignments

ACADEMIC SUPPORT

It is The Hashemite University policy to provide educational opportunities that ensure fair, appropriate and reasonable accommodation to students who have disabilities that may affect their ability to participate in course activities or meet course requirements. Students with disabilities are encouraged to contact their Instructor to ensure that their individual needs are met. The University through its Special Need section will exert all efforts to accommodate for individual's needs.

Special Needs Section:
Tel:
Location:
Email:

COURSE REGULATIONS

Participation

Class participation and attendance are important elements of every student's learning experience at The Hashemite University, and the student is expected to attend all classes. A student should not miss more than 15% of the classes during a semester. *Those exceeding this limit of 15% will receive a failing grade regardless of their performance*. It is a student's responsibility to monitor the frequency of their own absences. **Attendance record begins on the first day of class irrespective of the period allotted to drop/add and late registration. It is a student's responsibility to sign-in; failure to do so will result in a non-attendance being recorded.**

In exceptional cases, the student, with the instructor's prior permission, could be exempted from attending a class provided that the number of such occasions does not exceed the limit allowed by the University. The instructor will determine the acceptability of an absence for being absent. A student who misses more than 25% of classes and has a valid excuse for being absent will be allowed to withdraw from the course.

Plagiarism

Plagiarism is considered a serious academic offence and can result in your work losing marks or being failed. HU expects its students to adopt and abide by the highest standards of conduct in their interaction with their professors, peers, and the wider University community. As such, a student is expected not to engage in behaviours that compromise his/her own integrity as well as that of the Hashemite University.

Plagiarism includes the following examples and it applies to all student assignments or submitted work:

- **Use of the work, ideas, images or words of someone else without his/her permission or reference to them.**
- **Use of someone else's wording, name, phrase, sentence, paragraph or essay without using quotation marks.**
- **Misrepresentation of the sources that were used.**

The instructor has the right to fail the coursework or deduct marks where plagiarism is detected

Late or Missed Assignments

In all cases of assessment, students who fails to attend an exam, class project or deliver a presentation on the scheduled date without prior permission, and/or are unable to provide a medical note, will automatically receive a fail grade for this part of the assessment.

- Submitting a term paper on time is a key part of the assessment process. Students who fail to submit their work by the deadline specified will automatically receive a 10% penalty. Assignments handed in more than 24 hours late will receive a further 10% penalty. Each subsequent 24 hours will result in a further 10% penalty.

- In cases where a student misses an assessment on account of a medical reason or with prior permission; in line with University regulations an incomplete grade for the specific assessment will be awarded and an alternative assessment or extension can be arranged.

Student Complaints Policy

Students at The Hashemite University have the right to pursue complaints related to faculty, staff, and other students. The nature of the complaints may be either academic or non-academic. For more information about the policy and processes related to this policy, you may refer to the students' handbook.

COURSE ASSESSMENT

Course Calendar and Assessment

Students will be graded through the following means of assessment and their final grade will be calculated from the forms of assessment as listed below with their grade weighting taken into account. The criteria for grading are listed at the end of the syllabus

Assessment	Grade Weighting	Deadline Assessment
Midterm Exam	40%	April 21,2022
Quizzes	10%	
Presentation	10%	
Final Exam	40%	

Description of Exams

Test questions will predominately come from material presented in the lectures. Semester exams will be conducted during the regularly scheduled lecture period. Exam will consist of a combination of multiple choice, short answer, match, true and false and/or descriptive questions.

Homework: Will be given for each chapter, while the chapter in progress you are supposed to work on them continuously and submit in next lecture when I finish the chapter.

You are also expected to work on in-chapter examples, self-tests and representative number of end of chapter problems. The answers of self-tests and end of chapter exercises are given at the end of the book.

Quizzes: Unannounced quizzes will be given during or/and at the end of each chapter based upon the previous lectures. It will enforce that you come prepared to the class.

No make-up exams, homework or quizzes will be given. Only documented absences will be considered as per HU guidelines.

Grades are not negotiable and are awarded according to the following criteria*:

Letter Grade	Description	Grade Points
A+	Excellent	4.00
A		3.75
A-		3.50
B+	Very Good	3.25
B		3.00
B-		2.75
C+	Good	2.50
C		2.25
C-		2.00
D+	Pass	1.75
D	Pass	1.50
F	Fail	0.00
I	Incomplete	-

WEEKLY LECTURE SCHEDULE AND CONTENT DISTRIBUTION

Week no.	Topic	Chapter Number	Assignment Out/Due
1 and 2	Analyzing algorithms and problems: Principles and examples of analyzing algorithms, the efficiency of algorithms, asymptotic growth functions, algorithm analysis and complexity, and recurrence relations.	1,2,3,4	
3 and 4	Sorting Algorithms: Merge Sort, Insertion sort. Heap sort, Quick sort.	2,6,7	Week #3 : Assignment 1
5 and 6	Searching algorithm: Binary search trees, and Red Black trees.	12,13	Week #6 : Assignment 2
Midterm Exam			
7 and 8	Dynamic programming: longest common subsequences.	15	
9 and 10	Dynamic programming: Matrix chain product	15	

Week no.	Topic	Chapter Number	Assignment Out/Due
11 and 12	Greedy algorithms: Activity selection, Knapsack problem, and Greedy v/s dynamic.	16	
13 and 14	Graph algorithms: Definitions and representations (adjacency matrix and adjacency list), Depth first search, Breadth first search.	22	
15 and 16	Graph algorithms: Minimum spanning trees, and Shortest paths	23,24	
Final Exam			