مركز الاعتماد وضمان الجودة

Course Syllabus

1	**Course title**	Data structures 2	
2	**Course number**	1901234	
3	**Credit hours**	3	
	Contact hours (theory, practical)	3 theory	
4	**Prerequisites/corequisites**	Data structures 1 (1941233)	
5	**Program title**	Computer Science	
6	**Program code**	01	
7	**Awarding institution**	The University of Jordan	
8	**School**	King Abdullah II School of Information Technology	
9	**Department**	Computer Science	
10	**Course level**	Second	
11	**Year of study and semester (s)**	Second year and second semester	
١٢	**Other department (s) involved in teaching the course**	-	
١٣	**Main teaching language**	English	
١٤	**Delivery method**	☐Face to face learning ☒Blended ☐Fully online	
١٥	**Online platforms(s)**	☒Moodle ☒Microsoft Teams ☐Skype ☐Zoom ☐Others……	
١٦	**Issuing/Revision Date**	10/2022	

١٧ **Course Coordinator:**

Name: Ansar Khoury Contact hours:
Office number: 106, 1st floor Phone number: +9625355000. Extension: 22581
Email: ansar@ju.edu.jo

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١٨ Other instructors:

١٩ Course Description:

Pointers. Classes. Virtual functions and abstract classes. Overloading. Recursion. Linked list: singly, doubly, circular. Stacks, Stack operations and Implementation of Stacks as linked-list. Queues, Queue operations and Implementation of Queues as linked-list. Trees, Binary Trees.

٢٠ Course aims and outcomes:

A- Aims:

The main goal of this course is to provide concepts about object oriented design, and its practical application in different linked data structures as Stacks; Queues; Recursion; Linked Lists; Binary trees; General trees, and its implementation in a language such as C++.

B- Students Learning Outcomes (SLOs): Upon successful completion of this course students will be able to…

A- Knowledge and Understanding: Students should …
A1) Understand the organization and manipulation of data.
A2) Know the important principles of program design.
A3) Learn the powerful features of C++ programming language.
A4) Understand the basic concepts involved in structured problem solving.
A5) Understand the advantages of object oriented programming.

A6) Grasp the advantages of data abstraction and abstract data types.

A7) Understand the basics of linked stack, queue and tree using class and pointers.

B- Intellectual skills: with the ability to …

B1) Compare and analyse algorithms as fundamental tools of program design.

B2) Analytically recognize large projects as smaller problems of manageable size that use stacks, queues and trees.

C- Subject specific skills – with ability to …

C1) Work on case studies to show how all the tools are used together to build a complete program.

C2) Develop methods to reduce program errors, verify used algorithms, and efficiently debug programs.

C3) Translate abstract ideas into practice.

C4) Implement and handle large projects that use stacks, queues and trees.

D- Transferable skills – with ability to

D1) Possess good programming style.

D2) Develop advanced structures and algorithms into complete programs.

D3) Choose the appropriate data structures for a certain project.

D4) Maintain the usefulness of the program, including software reusability and maintenance.

٢١. Topic Outline and Schedule:

Week	Lecture	Topic	Intended Learning Outcome	Learning Methods (Face to Face/Blended/ Fully Online)	Platform	Synchronous / Asynchronous Lecturing	Evaluation Methods	Resources
1	1.1	Review of Pointers and classes.		Face to Face		Synchronous Lecturing		Chapter 3
	1.2			Face to Face		Synchronous Lecturing		
	1.3			Blended	Microsoft Teams + Moodle	Asynchronous Lecturing	in class questions + quizzws	
2	2.1	Lists		Face to Face		Synchronous Lecturing		Chapter 5

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	2.2	•Advantage and disadvantage of the array and linked implementation.		Face to Face		Synchronous Lecturing		
	2.3			Blended	Microsoft Teams + Moodle	Asynchronous Lecturing	in class questions + quizzws	
Week	**Lecture**	**Topic**	**Intended Learning Outcome**	**Learning Methods (Face to Face/Blended/ Fully Online)**	**Platform**	**Synchronous / Asynchronous Lecturing**	**Evaluation Methods**	**Resources**
3	3.1	•Single Linked Lists operations (search, insertion, deletion)		Face to Face		Synchronous Lecturing		Chapter 5
	3.2			Face to Face		Synchronous Lecturing		
	3.3			Blended	Microsoft Teams + Moodle	Asynchronous Lecturing	in class questions + quizzws	
4	4.1	•Doubly Linked Lists operations (search, insertion, deletion)		Face to Face		Synchronous Lecturing		Chapter 5
	4.2			Face to Face		Synchronous Lecturing		
	4.3			Blended	Microsoft Teams + Moodle	Asynchronous Lecturing	in class questions + quizzws	
5	5.1	•Circular Linked Lists operations (search, insertion, deletion) •Lists applications		Face to Face		Synchronous Lecturing		Chapter 5
	5.2			Face to Face		Synchronous Lecturing		
	5.3			Blended	Microsoft Teams + Moodle	Asynchronous Lecturing	in class questions + quizzws	
6	6.1	Stacks Linked implementation of stacks operations and stack applications (calculator and bracket matching)		Face to Face		Synchronous Lecturing		Chapter 7
	6.2			Face to Face		Synchronous Lecturing		
	6.3			Blended	Microsoft Teams + Moodle	Asynchronous Lecturing	in class questions + quizzws	
7	7.1	Queues Linked implementation of queues		Face to Face		Synchronous Lecturing		Chapter 8
	7.2			Face to Face		Synchronous Lecturing		

	7.3	**operations and queue applications (priority queue)**		**Blended**	**Microsoft Teams + Moodle**	**Asynchronous Lecturing**	**in class questions + quizzws**	
8	8.1	**Recursion** **Concepts of recursive functions (review), advance implementation of recursive operations on DS.**		**Face to Face**		**Synchronous Lecturing**		**Chapter 6**
	8.2			**Face to Face**		**Synchronous Lecturing**		
	8.3			**Blended**	**Microsoft Teams + Moodle**	**Asynchronous Lecturing**	**in class questions + quizzws**	
9	9.1	**Binary Trees** **•Basic concepts, Binary Search Trees (BST)**		**Face to Face**		**Synchronous Lecturing**		**Chapter 11**
	9.2			**Face to Face**		**Synchronous Lecturing**		
	9.3			**Blended**	**Microsoft Teams + Moodle**	**Asynchronous Lecturing**	**in class questions + quizzws**	
10	10.1	**•BST operations (search, insertion, deletion), traversal and applications**		**Face to Face**		**Synchronous Lecturing**		**Chapter 11**
	10.2			**Face to Face**		**Synchronous Lecturing**		
	10.3			**Blended**	**Microsoft Teams + Moodle**	**Asynchronous Lecturing**	**in class questions + quizzws**	
11	11.1	**Other types of trees and their concepts, basic operations and applications:** **•Red-Black Trees**		**Face to Face**		**Synchronous Lecturing**		**Chapter 11**
	11.2			**Face to Face**		**Synchronous Lecturing**		
	11.3			**Blended**	**Microsoft Teams + Moodle**	**Asynchronous Lecturing**	**in class questions + quizzws**	
12	12.1	**•AVL Trees** **•Segment Trees**		**Face to Face**		**Synchronous Lecturing**		**Chapter 11**
	12.2			**Face to Face**		**Synchronous Lecturing**		

	12.3			**Blended**	**Microsoft Teams + Moodle**	**Asynchronous Lecturing**	**in class questions + quizzws**	
13	13.1	**Hashing** **Hashing functions, collision resolution, Hash table in STL and their applications**		**Face to Face**		**Synchronous Lecturing**		**Chapter 9**
	13.2			**Face to Face**		**Synchronous Lecturing**		
	13.3			**Blended**	**Microsoft Teams + Moodle**	**Asynchronous Lecturing**	**in class questions + quizzws**	
14	14.1	**Graph** **Basic concepts, graph representation (array-based, linked list-based) and their advantage and disadvantage, graph applications**		**Face to Face**		**Synchronous Lecturing**		**Chapter 12**
	14.2			**Face to Face**		**Synchronous Lecturing**		
	14.3			**Blended**	**Microsoft Teams + Moodle**	**Asynchronous Lecturing**	**in class questions + quizzws**	
15	15.1	**Revision**		**Face to Face**		**Synchronous Lecturing**		
	15.2			**Face to Face**		**Synchronous Lecturing**		
	15.3			**Blended**	**Microsoft Teams + Moodle**	**Asynchronous Lecturing**	**in class questions + quizzws**	

٢٢ Evaluation Methods:

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Opportunities to demonstrate achievement of the SLOs are provided through the following assessment methods and requirements:

Evaluation Activity	Mark	Topic(s)	SLOs	Period (Week)	Platform
Quizzes	30				
Mid Exam	30				
Final Exam	40				

٢٣ Course Requirements

- Computer
- Internet connection
- Account on MS Teams, Moodle
- MS Visual Studio (C++)

٢٤ Course Policies:

A- Attendance policies:

Maximum allowable absence 15% of number of lectures per semester.

B- Absences from exams and handing in assignments on time:

Students are expected are expected to completely adhere to the assignments strict deadlines, absolutely no exceptions are given.

It's student's responsibility to inform his instructor about his absence from any exam during period not exceeding 3 days.

If you miss the midterm, then a makeup exam will not be provided unless you submit a valid absence excuse, within three days from the midterm, to your lecturer. This excuse must be signed and stamped from the UJ hospital in order to be valid. If your lecturer accepts the excuse then you will be able to take the makeup. You need to follow up the departmental announcements regarding the makeup date and time. Please note that the lecturer may either accept or reject your excuse based on UJ regulations.

C- Health and safety procedures:

Full safety of the computer labs.

D- Honesty policy regarding cheating, plagiarism, misbehavior:

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Students' cheating, plagiarism and misbehavior will be transformed to special committee.

E- Grading policy + Weighting (i.e. weight assigned to exams as well as other student work)

Intended grading scale

0 - 40	F
41-49	D-
50-53	D
54-57	D+
58-61	C-
62-66	C
67-70	C+
71-75	B-
76-79	B
80-84	B+
85-89	A-
90-100	A

F- Available university services that support achievement in the course:

Equipped Computer labs.

G- Statement on Students with disabilities

Students with Disabilities: Students with disabilities who need special accommodations for this class are encouraged to meet with the instructor and/or their academic advisor as soon as possible. In order to receive accommodations for academic work in this course, students must inform the course instructor and/or their academic advisor, preferably in a written format, about their needs no later than the 4th week of classes.

٢٥ References:

A- Required book (s), assigned reading and audio-visuals:

DATA STRUCTURES USING C++, by D.S. Malik, Second Edition.

B- Recommended books, materials, and media:

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- Data Structures and Algorithms in C++, John Wiley and Sons, Michael T. Goodrich, Roberto Tamassia, David M. Mount, 2011.
- C++ Plus Data Structures, by Nell Dale, 2011.

٢٦ Additional information:

ملاحظة١: في حالة التغيب عن امتحان الـ Mid Term لن يكون هناك امتحان تعويضي إلا في حالة وجود عذر وحالة طارئة من المستشفى. على الطالب إبراز العذر لمدرس المادة في فتره لا تتجاوز الثلاثة أيام من تاريخ الامتحان, وللمدرس الحق في قبول أو رفض العذر , وحسب التعليمات.

ملاحظة٢: لتفادي المشاكل والأخطاء التي تنتج, لا يجوز إجراء النقل الداخلي بأي حال من الأحوال.

For more details on University regulations please visit http://www.ju.edu.jo/rules/index.htm

Moodle:

http://elearning.ju.edu.jo/

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Name of Course Coordinator: Ansar Khoury Signature: ---------- Date: 10/2022
Head of Curriculum Committee/Department: ---------- Signature: ----------
Head of Department: ---------- Signature: ----------
Head of Curriculum Committee/Faculty: ---------- Signature: ----------
Dean: ---------- Signature: ----------