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Course Syllabus

1	**Course title**	Data Structures
2	**Course number**	1901242
3	**Credit hours**	3 (theory, practical)
	Contact hours (theory, practical)	3 (theory, practical)
4	**Prerequisites/corequisites**	Object-Oriented Programming
5	**Program title**	B.Sc. in 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 Year
11	**Year of study and semester (s)**	Second, Spring
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**	June, 2022

١٧ Course Coordinator:

Name:	Contact hours:
Office number:	Phone number:
Email:	

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١٨ Other instructors:

Name: Office number: Phone number: Email: Contact hours: Name: Office number: Phone number: Email: Contact hours:

١٩ Course Description:

This Course introduces the students to the concepts of data structures. Topics includes: Pointers, and pointer operations. Array implementation of lists, stacks, and queues. Dynamic implementation of lists (singly, doubly, circular), stack operations and queue operations (and their implementation as linked lists). STL, like: vectors, pairs, maps, sets, lists, stacks, queue. Recursion. Tree dynamic, like binary search trees, segment, red-black, AVL trees. Hash Table and Collision resolution. Weekly lab assignments will be given to the students, in addition to problem solving tasks.

٢٠ Course aims and outcomes:

A- Aims:
The main goal of this course is to provide concepts about data structures design in C++, and its practical application in different contiguous and dynamic data structures.

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

A Knowledge and understanding: Students should

A1) Review of the OOP concepts in C++

A2) Understand basic concepts of pointers and its usage

A3) Understand the usage and implement basic List (singly, doubly and circular array-based and dynamic) data structure.

A4) Understand the usage and implement basic Stack (array-based and dynamic) data structure.

A5) Understand the usage and implement basic Queue (array-based and dynamic) data structure.

A6) Understand the basic concept of complexity and how to use built-in binary search and sort

A7) Understand the implementation and usage of STL list, stack and queue.

A8) Understand the implementation and usage of some of the STL data structures, like: Vectors, Pairs, Maps, priority queue and sets.

A9) Understand the concept of recursion and its usage.

A10) Understand the concept of binary search trees dynamic and its operations

A11) Understand the concept of other Tree dynamics, like Segment tree, AVL tree and RB tree and its usage

A12) Understand the concept of hash table and collision resolution.

B Intellectual skills: with the ability to

B1) Build a complete model for a data structure using the dynamic implementation of lists, stacks, and queues.

B2) Build a complete model for a data structure using the dynamic implementation of trees.

B3) Contrast the structure and function of different data structures discussed in Class

C Subject specific skills: with ability to

C1) Build and write a complete C++ program with proper use of classes, objects and data structures.

C2) Solve a real-life scenario by writing a complete C++ program with all the features required

D Transferable skills: with ability to

D1) Work in a group in order to implement specific subject using C++ programming language, object-oriented techniques and data structures, and be able to present the final work and make a demo.

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٢١. Topic Outline and Schedule:

Week	Lecture	Topic	SO	Learning Methods (Face to Face/Blended/ Fully Online)	Platform	Synchronous / Asynchronous Lecturing	Evaluation Methods	Resources
1	1.1	Structures Review	1,2	Blended	In the lab / MS. Teams	Synchronous	In class questions	Chapters 1-8
	1.2	Classes Review		Blended	In the lab / MS. Teams	Synchronous		
	1.3	Composition Review		Blended		**Asynchronous**	exercises	Video, Slides, Book Ch 9
2	2.1	Inheritance Review	1,2	Blended	In the lab / MS. Teams	Synchronous	In class questions	Chapter 9
	2.2	Template example		Blended	In the lab / MS. Teams	Synchronous		
	2.3	**Pointers**				**Asynchronous**	exercises	Video, Slides, Book Ch 10
3	3.1	Pointers examples	1,2	Blended	In the lab / MS. Teams	Synchronous	In class questions	Chapter 10
	3.2	Pointers examples		Blended	In the lab / MS. Teams	Synchronous		
	3.3	**List**				**Asynchronous**	exercises	Video, Slides, Book Ch 10
4	4.1	List examples	1,2	Blended	In the lab / MS. Teams	Synchronous	In class questions	Chapter 10
	4.2	List examples		Blended	In the lab / MS. Teams	Synchronous		
	4.3	**List**				**Asynchronous**	exercises	Video, Slides, Book Ch 11
5	5.1	List examples	1,2	Blended	In the lab / MS. Teams	Synchronous	In class questions	Chapter 11
	5.2	List examples		Blended	In the lab / MS. Teams	Synchronous		
	5.3	**Stack**				**Asynchronous**	exercises	Chapters 10, 11
6	6.1	stack examples	1,2,6	Blended	In the lab / MS. Teams	Synchronous	In class questions	Chapters 10, 11
	6.2	stack examples		Blended	In the lab / MS. Teams	Synchronous		
	6.3	**Queue**				**Asynchronous**	exercises	Video, Slides, Book Ch 13
7	7.1	Queue examples	1,2,6	Blended	In the lab / MS. Teams	Synchronous	In class questions	Chapter 13
	7.2	Queue examples		Blended	In the lab / MS. Teams	Synchronous		
	7.3	**STL: List, Stack, Queue**				**Asynchronous**	exercises	Video, Slides, Book Ch3: ref

8	8.1	STL: List, Stack, Queue example	1,2,6	Blended	In the lab / MS. Teams	Synchronous	In class questions	Chapter 3: ref
	8.2	STL: List, Stack, Queue example		Blended	In the lab / MS. Teams	Synchronous		
	8.3	**STL: Vectors, Pairs**				**Asynchronous**	exercises	Video, Slides, Book Ch 17, ref 4
9	9.1	STL: Vectors, Pairs example	1,2,6	Blended	In the lab / MS. Teams	Synchronous	In class questions	Chapter 17, ref 4
	9.2	STL: Vectors, Pairs example		Blended	In the lab / MS. Teams	Synchronous		
	9.3	**STL: Maps, Sets**				**Asynchronous**	exercises	Video, Slides, Book Ch 17, ref 4
10	10.1	STL: Maps, Sets example	1,2,6	Blended	In the lab / MS. Teams	Synchronous	In class questions	Chapter 17, ref 4
	10.2	STL: Maps, Sets example		Blended	In the lab / MS. Teams	Synchronous		
	10.3	**Recursion**				**Asynchronous**	exercises	Ch 17, ref 3, 4
11	11.1	Recursion example	1,2	Blended	In the lab / MS. Teams	Synchronous	In class questions	Ch 17, ref 3, 4
	11.2	Recursion example		Blended	In the lab / MS. Teams	Synchronous		
	11.3	**Complete Example**				**Asynchronous**	exercises	Video, Slides, Book Ch 12, 15, 18
12	12.1	**Complete Example**	1,2	Blended	In the lab / MS. Teams	Synchronous	In class questions	Chapter 18
	12.2	**Complete Example**		Blended	In the lab / MS. Teams	Synchronous		Chapter 12
	12.3	**Binary Search Tree**				**Asynchronous**	exercises	Video, Slides, Book Ch 21
13	13.1	BST example	1,2	Blended	In the lab / MS. Teams	Synchronous	In class questions	Chapter 21
	13.2	BST example		Blended	In the lab / MS. Teams	Synchronous		
	13.3	**Segment, RB and AVL Trees**				**Asynchronous**	exercises	Video, Slides, Book Ch 21
14	14.1	Segment, RB trees example	1,2	Blended	In the lab / MS. Teams	Synchronous	In class questions	Chapter 21
	14.2	AVL trees example		Blended	In the lab / MS. Teams	Synchronous		
	14.3	**Hash and Collision resolution**				**Asynchronous**	exercises	Video, Slides, Book Ch 15
15	15.1	Hash example	1,2	Blended	In the lab / MS. Teams	Synchronous	In class questions	Chapter 15
	15.2	Collision example		Blended	In the lab / MS. Teams	Synchronous		
	15.3	exercises				**Asynchronous**	exercises	Codeforces. com
16	**Final Exam**							

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٢٢ Evaluation Methods:

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
Unified Quiz-1	20	Pointers, List, Stack, and Queue	A1-A5, B1, C, D	Week 7	Practical exam
Midterm Exam	30	The above and STL, Recursion	A1-A9, B1, B2, C, D	Week 11	Practical exam
Unified Quiz-2	10	Trees	A10-A11, B2, B3, C, D	Week 14	MCQs
Final Exam	40	All the material	A, B, C, D	Week 16	Paper-based

٢٣ Course Requirements

(e.g: students should have a computer, internet connection, webcam, account on a specific software/platform…etc):

1. Personal computers in labs.
2. Data show.
3. Microsoft Visual Studio Software.

٢٤ Course Policies:

A- Attendance policies:

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

B- Absences from exams and submitting assignments on time:

Students are expected are expected to completely adhere to the assignment's 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.

C- Health and safety procedures:

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D- Honesty policy regarding cheating, plagiarism, misbehavior:

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

E- Grading policy:

Midterm exam (Practical: 30 marks), Unified Quizzes (Practical: 30 marks), Final exam (paper-based: 40 marks). This scale is for guidance only, it may or may not be appropriate for this term performance and therefore, it may change…

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.

٢٥ References:

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

C++ programming: program design including data structures, by D.S. Malik, 8th edition.

B- Recommended books, materials, and media:

C++ Plus Data Structures, 3rd Edition, by Nell Dale, Jones & Bartlett Learning.

٢٦ Additional information:

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

- Students with special needs to describe their needs to their instructors within the first two weeks of classes in order to secure their needs. If students with special needs fail to communicate their requirements to their instructors soon enough, their instructors may not be able to secure their requirements in a timely fashion.

Name of Course Coordinator: **Dr. Heba Saadeh** Signature: ---------- Date: **25/06/2022**

Head of Curriculum Committee/Department: ---------- Signature: ----------

Head of Department: ---------- Signature: ----------

Head of Curriculum Committee/ Faculty: ---------- Signature: ----------

Dean: ---------- Signature: ----------