MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Data Structure**			**Module Delivery**	
Module Type	**Core**			☒**Theory** ☒**Lecture** ☒**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	**COM-212**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	2		**Semester of Delivery**	3	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Ali Abdulrahman Mahmood		**e-mail**	alialani@uodiyala.edu.iq	
Module Leader's Acad. Title	lecturer assistant		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/8//2024		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	COM-121	**Semester**	1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. The objective required of the student in order to successfully pass the course requirements is to understand how - through - data is represented and stored - inside the calculator. 2. The student's realization of the types of algorithms used in data representation. 3. Developing the student's ability to use the software available in this field, in addition to the skills he acquires in data processing and how they are represented inside the calculator. 4. Developing the student's ability to write software that handles data and how to represent it in a calculator.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1. Display an Introduction to Data structures. 2. List the Strategies for choosing the right data structure. 3. Explain the first Linear data structures- Array. 4. Explain the Pointer and its operations,applications. 5. Describe the Structure. 6. Define the Linked list and its operations,applications. 7. Identify the second Linear Data Structure: The Stack 8. Discuss the third Linear Data Structure: The Queue 9. Explain the The Graph 10. Explain the The Tree. 11. Identify the Heaps and its operations 12. Describe the searching, sorting
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Basics • Algorithm Specifications: Performance Analysis and Measurement (Time and space analysis of algorithms- Average, best and worst case analysis) Introduction To Data Structure: • Data Management concepts, • Data types – primitive and non-primitive, • Types of Data Structures- Linear & Non Linear Data Structures. Linear Data Structure • Array: Representation of arrays, Applications of arrays, sparse matrix and its representation., • Stack: Stack-Definitions & Concepts, Operations On Stacks, Applications of Stacks, Polish Expression, Reverse Polish Expression And Their Compilation, Recursion, Tower of Hanoi, • Queue: Representation Of Queue, Operations On Queue, Circular Queue, Priority Queue, Array representation of Priority Queue, Double Ended Queue, Applications of Queue, • Linked List: Singly Linked List, Doubly Linked list, Circular linked list ,Linked implementation of Stack, Linked implementation of Queue, Applications of linked list.

	Nonlinear Data Structure : • Tree-Definitions and Concepts, Representation of binary tree, Binary tree traversal (Inorder, postorder, preorder), • Threaded binary tree, • Binary search trees, • Conversion of General Trees To Binary Trees, • Applications Of Trees- Some balanced tree mechanism, eg. AVL trees, 2-3 trees, Height Balanced, Weight Balance , • Graph-Matrix Representation Of Graphs, Elementary Graph operations,(Breadth First Search, Depth First Search, Spanning Trees, Shortest path, Minimal spanning tree). SORTING And SEARCHING • Insertion Sort, • Quick Sort, • Merge Sort, • Heap Sort, • Sorting On Several Keys, • List and Table Sort,

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	• At the start of course, the course delivery pattern, prerequisite of the subject will be discussed. • Lectures will be conducted with the aid of multi-media projector, black board, OHP etc. • Attendance is compulsory in lecture which carries 10 marks in overall evaluation. • One internal exam will be conducted as a part of internal theory evaluation. • Assignments based on the course content will be given to the students for each unit and will be evaluated at regular interval evaluation. • Surprise tests/Quizzes/Seminar/tutorial will be conducted having a share of five marks in the overall internal evaluation. • The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures. • Experiments shall be performed in the laboratory related to course contents.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.7

Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	4 and 8	LO #1, #2 and #3
	Assignments	2	10% (10)	6 and 14	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	15	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	an Introduction to Data structures.
Week 2	the Strategies for choosing the right data structure.
Week 3	the Linear data structures- Array /one dimensional array
Week 4	An array/ two dimensional array
Week 5	the Pointer and its operations, applications
Week 6	the Structure.
Week 7	Mid- term Exam
Week 8	the Linked list, linked list types and its operations, applications
Week 9	the second Linear Data Structure: The Stack
Week 10	the third Linear Data Structure: The Queue
Week 11	The Graph
Week 12	The Tree, binary tree
Week 13	the Heaps and its operations
Week 14	Sorting
Week 15	Searching , Searching types
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Introduction to C++ Programming Language.
Week 2	1D array operations
Week 3	2D array operations
Week 4	structures & pointers in C
Week 5	Write a program for linked list insertion, deletion & copy
Week 6	Stack operations Write a program to perform PUSH, POP, PEEP & CHANGE operations on Stack using array.
Week 7	Stack operations Write a program to perform PUSH, POP, PEEP & CHANGE operations on Stack using linked list.
Week 8	Midterm Exam
Week 9	Queue Operations Write a program to implement insertion & deletion in a queue using array.
Week 10	Queue Operations Write a program to implement insertion & deletion in a queue using linked list.
Week 11	Circular Queue Operations Write a program to implement insertion & deletion in a circular
Week 12	Sorting and searching: Write a program to perform • Selection sort
Week 13	Sorting and searching: Write a program to perform • Merge sort
Week 14	Sorting and searching: Write a program to perform • Quick sort
Week 15	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1-Tanenbaum Aaron M, Langsam Yedidyah, Augenstein J Moshe, Data Structures using C. 2-Tremblay J.P and Sorenson P.G, An introduction to data structures with applications, Tata McGraw Hill, 2nd Edition	Yes
Recommended Texts	1-Fundamentals of Computer Algorithms by Horowitz, Sahni,Galgotia Pub. 2001 ed. 4. 2-Fundamentals of Data Structures in C++-By Sartaj Sahani. 3- Data Structures: A Pseudo-code approach with C -By Gilberg & Forouzan Publisher-Thomson Learning	yes
Websites	Data Structures by Lipschutz Seymour [Schaum's Outline]	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.