



الملحق ٤: وصف المادة الدراسية

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information				
معلومات المادة الدراسية				
Module Title	Data Structures and Algorithms		Module Delivery	
Module Type	Core		☒ Theory ☒ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	CPE 205			
ECTS Credits	6			
SWL (hr/sem)	150			
Module Level	2	Semester of Delivery		3
Administering Department	Computer Eng.	College	College of Engineering	
Module Leader	Dhafer Taha Shihab		e-mail	dhafer.shihab@uodiyala.edu.iq
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	MSc	
Module Tutor	Name (if available)		e-mail	E-mail
Peer Reviewer Name			e-mail	
Scientific Committee Approval Date	02/06/2024	Version Number	1.0	

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CPE 102	Semester	2
Co-requisites module	None	Semester	



**Ministry of Higher Education and
Scientific Research - Iraq
University of Diyala
College of Engineering
Department of Computer Engineering**



Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	Upon completion of this course, the student will be able to: 1. To provide the knowledge of basic data structures and their implementations. 2. To understand importance of data structures in context of writing efficient programs. 3. To develop skills to apply appropriate data structures in problem solving. 4. To provide the knowledge of categorizing efficiency of Algorithms in time and memory use. 5. To provide the knowledge of sorting and searching algorithms
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon Completion this Course, the students will able to: 1. Learn the basic types for data structure, implementation and application. 2. Know the strength and weakness of different data structures. 3. Use the appropriate data structure in context of solution of given problem. 4. Learn some idea of how to work out the efficiency of an algorithm 5. Develop programming skills which require to implement sorting and searching algorithms.
Indicative Contents المحتويات الإرشادية	• Introduction to Data Structures, Single Linked Lists, Linked Lists Functions (3 hrs). • Reverse List, Double Linked Lists, Stack and its Algorithms, Stack Implementation using Array (3 hrs). • Stack Implementation Using Linked Lists, Applications of Stack, Infix to Postfix Notation, Evaluation of Postfix Expression (3 hrs) • Queue and its Algorithms, Queue implementation using Array, Stack Implementation Using Linked Lists. (3 hrs) • Circular Queue and its Algorithms, Circular Queue implementation using Array, Circular Queue implementation using Linked List. (3 hrs) • Trees and its terminologies, Types of Tree and its operations. (3 hrs) • Tree Traversals, recursion and non-recursion traversals. (3 hrs) • Tree Applications. (3 hrs) • Graph and its terminologies, Representation of Graph, Operations of graph. (3hrs) • Graph Applications, Breadth First Search (BFS), Depth First Search (DFS) (3 hrs) • Minimum Spanning Tree, Shortest Path. (3 hrs) • Searching,, Big Oh-O Notation, Efficiency Considerations in Sorting Algorithms. (3 hrs) • Linear Search, Analysis of Linear Search, Binary Search, Analysis of Binary search. (3 hrs) • Sorting, Efficiency Considerations in Sorting Algorithms, Bubble Sort. (3 hrs) • Insertion Sort, Quick Sort, Heap Sort. (3 hrs)



**Ministry of Higher Education and
Scientific Research - Iraq
University of Diyala
College of Engineering
Department of Computer Engineering**



Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, homework's and examples. Practical examples helps students to understand the course material.
-------------------	--

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.8
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	20% (10)	7 and 14	LO #2 and #5
	Assignments	2	10% (5)	11 and 13	LO #4 and #5
	Projects / Lab.	1	10% (10)		
	Report				
Summative assessment	Midterm Exam	1 hr	10% (10)	9	LO #1 - #3
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		



**Ministry of Higher Education and
Scientific Research - Iraq
University of Diyala
College of Engineering
Department of Computer Engineering**



Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Data Structures, Single Linked Lists, Linked Lists Functions
Week 2	Reverse List, Double Linked Lists, Stack and its Algorithms, Stack Implementation using Array
Week 3	Stack Implementation Using Linked Lists, Applications of Stack, Infix to Postfix Notation, Evaluation of Postfix Expression
Week 4	Queue and its Algorithms, Queue implementation using Array, Stack Implementation Using Linked Lists,
Week 5	Circular Queue and its Algorithms, Circular Queue implementation using Array, Circular Queue implementation using Linked List.
Week 6	Trees and its terminologies, Types of Tree and its operations
Week 7	Tree Traversals, recursion and non-recursion traversals
Week 8	Tree Applications
Week 9	Graph and its terminologies, Representation of Graph, Operations of graph,
Week 10	Graph Applications, Breadth First Search (BFS), Depth First Search (DFS)
Week 11	Minimum Spanning Tree, Shortest Path
Week 12	Searching,, Big Oh-O Notation, Efficiency Considerations in Sorting Algorithms
Week 13	Linear Search, Analysis of Linear Search, Binary Search, Analysis of Binary search
Week 14	Sorting, Efficiency Considerations in Sorting Algorithms, Bubble Sort.
Week 15	Insertion Sort, Quick Sort, Heap Sort
Week 16	Preparatory week before the final Exam



**Ministry of Higher Education and
Scientific Research - Iraq
University of Diyala
College of Engineering
Department of Computer Engineering**



Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Implementing singly Linked List
Week 2	Implementing Doubly Linked List
Week 3	Implementing Stack using Array and Linked List
Week 4	Implementing Stack applications
Week 5	Implementing Queue using Array and Linked List
Week 6	Implementing Tree Algorithms
Week 7	Implementing Tree Applications
Week 8	Implementing Tree Applications (cont.)
Week 9	Implementing Graph
Week 10	Implementing Minimum Spanning Tree
Week 11	Implementing Shortest Path
Week 12	Implementing Linear Search and Binary Search
Week 13	Implementing Bubble Sort
Week 14	Implementing Insertion Sort
Week 15	Implementing Heap Sort and Quick Sort

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Vinu V Das, Principles of Data Structures Using C and C++	No
Recommended Texts	- Ramesh Vasappanavara, Anand Vasappanavara, Data Structures using C by practice. - D.S. MALIK, Data Structures Using C++, second edition, 2nd Edition. - Robert L. Kruse, Alexander J. Ryba, Data Structures and Program Design in C++.	No
Websites		



**Ministry of Higher Education and
Scientific Research - Iraq
University of Diyala
College of Engineering
Department of Computer Engineering**



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 (فيد 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.