



كلية الهندسة – جامعة قناة السويس
السويس



وحدة ضمان الجودة



Course Specification

Course Code: CCE331

Course Title: Algorithms and data structures

(1).Basic information

Program Title	Computer and Control			
Department offering the program	Computer and Control Dept.			
Department offering the course	Computer and Control Dept.			
Course Code	CCE331			
Year/level	second term- 2022/2023 / 4 th level			
Specialization	Major			
Teaching Hours	Total	Practical	Tutorial	Lectures
	4	2	-	2
Date of approval of Bylaw	2021			

(2).Course Aims

No.	Aims
1.	1. Apply knowledge of of various data structures when constructing a program as well as analytical, critical and systematic thinking abilities to identify and solve real engineering problems using data structure

(3). Learning Outcomes of Course (LOs)	
C1.1	Identify fundamental data structures
C1.2	understand the basics of search and sort algorithms.
C2.1	Analyze programing problems
C2.2	create programs with appropriate data structure and sorting algorithms
C3.1	Functions as an effective member or leader of diverse engineering teams, including those with multi-level, multi-disciplinary and multi-cultural dimensions.

(4). Course Contents					
Week No.	Topics	Lecture	Tutorial	Practical	Total
1	Introduction to data structures and the importance of data organization, performance measures	2			2
2	Searching Algorithms (Linear Search, Binary Search) Sorting Algorithms (Bubble Sort, Selection Sort, Insertion Sort)	2		2	4
3	Recursion (Recursive Binary Search)	2		2	4
4	Lists (Static vs. Dynamic Arrays), Pointers, Introduction to Linked Lists	2		2	4
5	Linked lists variants (single, doubly, and circular)	2		2	4
6	Stacks & Queues (using static arrays, dynamic arrays, and linked lists)	2		2	4
7	Mid-Term Exam	-		-	-
8	Hash Tables (Hash table, Hash functions, open and closed hashing, probing methods)	2		2	4
9	Research Discussions	2		2	4
10	Trees (General trees, Binary trees, BST, Tree Traversal)	2		2	4
11	Trees (General trees, Binary trees, BST, Tree Traversal)	2		2	4
12	Graphs	2		2	4
13	Priority Queue, Heap, and Heap sort	2		2	4
14	Mini project	2		2	4
15	Practical Exam	-			
16	Final exam				
	total	26	-	24	50

(5). Teaching and Learning methods	
No.	Teaching Method
1.	Interactive lectures
2.	Active learning e.g. group discussion, brain storming, demonstration.
3.	Problem and Project based learning

4.	Labs
5.	Self-Learning

(6). Teaching and Learning methods of Disabled Students

No.	Teaching Method	Reason
1.	Additional tutorial	
2.	On line lectures	

(7). Students Assessment

)7.1(Students Assessment Method

No.	Assessment Method	Los
1	Attendance	
2	Reports	C2.1,C2.2,C3.1
3	Quiz 1 / Quiz 2	C2.1,C2.2,C3.1
4	mini project	C2.1,C2.2,C3.1
5	Mid-term Exam	C1.1, C1.2, C2.1,C2.2
6	Final Practical Exam	C1.1, C1.2, C2.1,C2.2,C2.3
7	Final Exam	C1.1, C1.2, C2.1,C2.2,C2.3

)7.2(Assessment Schedule

No.	Assessment Method	Weeks
1	Attendance	Weekly
2	Reports/ Sheets	Bi-weekly
3	Quiz 1 / Quiz 2	4& 10
4	Mini project	15
5	Mid-term Exam	8
6	Final Practical Exam	15
7	Final Exam	16

)7.3 (Weighting of Assessments

No.	Assessment Method	Weights %	Weights
1	Attendance	5%	5
3	Quiz 1 / Quiz 2	5%	5
4	mini project	5%	5
5	Mid-term Exam	25%	25
6	Final Practical Exam	10 %	10
7	Final Exam	50%	50
Total		100%	100

(8). List of References

[1].	Data Structures and Algorithm Analysis in C++by Clifford A. Shaffer.
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[2].	Data Structures: A Pseudo code Approach with C++ by Richard
[3]	F. Gilberg and Behrouz A. Forouzan - ISBN 053495216X
[4]	Data Structures via C++: Objects by Evolution by A. Michael Berman ISBN – 0195108434
[5]	Data Structures, Algorithms in C++Second Edition By Adam Drozdek.
[6]	Data Structures and Algorithms in Java second edition by Adama Drozdek

(9). Facilities required for teaching and learning

1.	Lecture room equipped with e-learning tools (computer, internet, mike, headphones, etc.)
2.	Moodle and Microsoft teams
3.	Data show
4.	Lab Facilities and simulation Software(CST)

(10).Matrix of Aims and LOs of the Course

No.	Topics	Aims	LOs
1.	Introduction to data structures and the importance of data organization, performance measures	1	C1.1,C1.2
2.	Searching Algorithms (Linear Search, Binary Search) Sorting Algorithms (Bubble Sort,Selection Sort, Insertion Sort)		
3.	Recursion (Recursive Binary Search)		
4.	Lists (Static vs. Dynamic Arrays), Pointers, Introduction to Linked Lists		
5.	Linked lists variants (single, doubly, and circular)		
1	Stacks & Queues (using static arrays, dynamic arrays, and linked lists)	1	C2.1, C2.2
7	Hash Tables (Hash table, Hash functions,open and closed hashing, probing methods)		
8	Research Discussions		
9	Trees (General trees, Binary trees, BST, Tree Traversal)		
10	Trees (General trees, Binary trees, BST, Tree Traversal)		
11	Graphs	1	C2.3,C3.1
12	Priority Queue, Heap, and Heap sort		
13	Hash Tables (Hash table, Hash functions,open and closed hashing, probing methods)		

(11). Matrix of Competencies/ Program LOs with Course LOs

No.	Competences/ Program LOs	No.	Course LOs
C1	Demonstrate a high level of competence in identifying, defining and solving Computers and Systems Engineering problems	C1.1	Identify fundamental data structures
		C1.2	understand the basics of search and sort algorithms.
C2	Select and apply appropriate mathematical tools, computing methods, design techniques and tools in Computers and Systems Engineering disciplines, for	C2.1	Analyze programing problems
		C2.2	Create programs with appropriate data structure and sorting algorithms

	modeling and analyzing Computer and Control systems		
C3	Evaluate different techniques and strategies for solving Computers and Systems Engineering problems.	C3.1	Functions as an effective member or leader of diverse engineering teams, including those with multi-level, multi-disciplinary and multi-cultural dimensions.

Title	Name	Signature
Course Coordinator	Dr. Marwa Gamal	
Head of Department	Prof.Dr. Eyad Oda	
Date of Approval	2022/ 2023	