

College of Computer Science and Information Systems
 Course Code : 212CSS-3
 Contact Hour : 3(0)

Department of Computer Science
 Data Structures
 Prerequisite : 113CSS-4

Coordinator -

2. Course Description

Study of common Abstract Data Types (ADTs), basic data structures and design and analysis of algorithms. Common ADTs: stack, queue, list, tree, priority queue, map and dictionary. Basic Data structures include arrays, linked lists, heaps, hash tables, search trees. Basic design and analysis of algorithms covers asymptotic notation, recursive algorithms, searching and sorting, tree traversal, graph algorithms.

3. Course Learning Outcomes

SL	By the end of this course, students should be able to:	Linkages to POs
1.	Describe basic ADTs (stack, queue, array, list, node list, priority queue, tree, map and dictionary) and their related data structure implementations(array, single linked structure, double linked structure, heap, hash table, binary search tree, AVL tree).	a(S),i(S)
2.	Distinguish between Abstract Data Types (ADTs), data structures and algorithms.	
3.	Calculate the costs (space/time) of data structures and their related algorithms, both source code and pseudo-code, using the asymptotic notation (O()).	
4.	Recognize basic concepts and techniques (recursive, sorting, searching, graph) used in design of basic algorithms.	
5.	Implement basic algorithms and ADTs using different data structures strategies.	
6.	Decide which type of data structures and algorithms best suits the problem they are solving.	

4. Learning Resources

Text	Data Structures and Algorithms in Java, 5th Edition, by Michael Goodrich and Roberto Tamassia.
Reference	Mark Allen Weiss: Data Structures and Algorithm Analysis in Java, 3rd Edition 2006.
Reference	Robert Lafore, Data Structures & Algorithms in Java, Latest Edition.

5. Course Content : The list below provides a summary of the material that will be covered during the course

Week	Topics	References Book / Others Source	Special Event	Tutorial Activities	Lab Activities
1.	Introduction to data structures and algorithms analysis	1.9,2, 4.1-4.2			
2.	Algorithms Analysis (cont.)	4.1-4.2		Tutorial 1	Lab activity 1
3.	Stacks and Queues	Quiz 1	Quiz 1	Tutorial 2	Lab activity 2
4.	Single and Node (double linked) Lists	3.2, 3.3, 6.2	Assignment 1	Tutorial 3	Lab activity 3
5.	Trees	7.1,7.3			Lab activity 4
6.	Binary Search Trees, AVL Tree	8.1.1, 8.1.3, 8.1.4, 8.2,8.3		Tutorial 4	Lab activity 5
7.	Priority Queues and Heaps	9.1-9.2	Assignment 2	Tutorial 5	Lab activity 6
8.	Sorting	9.2-9.3	Midterm Exam	Tutorial 6	Lab activity 7
9.	Maps and Hashes	10.1-10.2			Lab activity 8

10.	Hashes and Dictionaries	11.1-11.2		Tutorial 7	Lab activity 9
11.	Hashes and Dictionaries	11.1-11.2		Tutorial 7	Lab activity 9
12.	Graphs	13.1-13.6		Tutorial 8	Lab activity 10
13.	Graphs	13.1-13.6		Tutorial 8	Lab activity 10
14.	No Lecture		Final Examination		

6. Evaluation Scheme: The following list is the contribution of course components to the final grade for the course.

Component	Weight (%)
Theory Assignments	6
Quizzes	4
First Midterm Exam	15
Second Midterm Exam	15
Lab Performanc	10
Final Lab Exam	10
Final Exam	40
Total	100

