DEPATMENT OF COMPUTER SCIENCE

IQRA UNIVERSITY ISLAMABAD

COURSE DESCRIPTION – CSC Data Structures and Algorithms

Iqra University, Islamabad Campus (A campus of Iqra University, Karachi)

Course Code	
Course Title	**Data structures and Algorithms**
Credit Hours	1
Prerequisites by Course(s) and Topics	
Course Description	Covers the analysis and implementation of data structures and algorithms to solve engineering problems using an object-oriented programming language. Topics include elementary data structures, (including arrays, stacks, queues, and lists), advanced data structures (including trees and graphs)
Course Objectives	• Implement various data structures and their algorithms and apply them in implementing simple applications • Apply the knowledge of data structure to other application domains.
Assessment Instruments with Weights (homework, quizzes, midterms, final, programming assignments, lab work, etc.)	Assignments: 05 Quizzes: 05 Lab Tasks: 10 Project: 05
Course Coordinator	Mr. Muhammad Awais / Mr. Sadiq Hussain
URL (if any)	All the courses details can be found on Iqra LMS. http://lms.iuic.net.pk
Current Catalog Description	
Textbook (or **Laboratory Manual** for Laboratory Courses)	
Reference Material	1. Data Structures and Algorithms in C++ by Adam Drozdek 2. Data Structures and Algorithm Analysis in Java by Mark A. Weiss 3. Data Structures and Abstractions with Java by Frank M. Carrano & Timothy M. Henry 4. Data Structures and Algorithm Analysis in C++ by Mark Allen Weiss Java Software Structures: Designing and Using Data Structures by John Lewis and Joseph Chase
Course Goals	
Topics Covered in the Course, with Number of Lectures on Each Topic (assume 15-week instruction and 3 hour lectures)	

1	An Introduction to data structure, linear non- linear data structures, operations on data structures, Introduction to array data structure, operations on array data structures(Insertion, deletion, searching sorting, and merging)
2	searching an unsorted array, Recursion and analyzing recursive algorithms, binary search for sorted arrays
3	complexity analysis, big O, Sorting algorithms (selection, insertion, bubble)
4	Sorting algorithms (shell, radix, bucket)
5	Divide and Conquer Algorithms(merge sort, quick sort)
6	Abstract data types, Introduction to link list, Link list ADT, single link list, new, delete, ->, next, memory management
7	doubly link list, circular link list, operations on link list(insertion, deletion, searching), sorted linked list

<table>
<tr><td></td><td colspan="4"><table>
<tr><td>8</td><td>Introduction to stack data structure, stack as ADT, operations on stack(push and pop),applications of stack(parenthesis count, infix to postfix and postfix evaluation)</td></tr>
<tr><td>9</td><td>Introduction to queue data structures, queues ADT, types of queues(simple queues,), operations on the queues(enqueue, dequeue)</td></tr>
<tr><td>10</td><td>hashing and indexing, open addressing and chaining,</td></tr>
<tr><td>11</td><td>Introduction to tree data structure, Tree ADT, types of trees, Binary Tree, Tree traversals (prefix. Infix, postfix)</td></tr>
<tr><td>12</td><td>Binary search trees, M-way tress, balanced trees</td></tr>
<tr><td>13</td><td>Heaps, priority queue, Graphs, Adjacency matrix and adjacency list representation</td></tr>
<tr><td>14</td><td>Breadth-first and depth-first traversal, implementation through adjacency matrix/list</td></tr>
<tr><td>15</td><td>Topological order, Shortest path algorithms</td></tr>
</table></td></tr>
<tr><td>Laboratory Projects/Experiments Done in the Course</td><td colspan="4">Details issued separately on the conduct of course project</td></tr>
<tr><td rowspan="2">Class Time Spent on (in credit hours)
Important</td><td>Assignments</td><td>Quizzes</td><td>Project</td><td>Social and Ethical Issues</td></tr>
<tr><td>5</td><td>5</td><td>5</td><td>10</td></tr>
<tr><td>Oral and Written Communications</td><td colspan="4">Emphasized through presentations and written assignments</td></tr>
</table>

Instructor Name: Khayal Abbas Akhtar

Instructor Signature: Khayal

Date: 11- June-2021