

Usman Habib, PhD

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Associate Professor

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**National University of Computer & Emerging Sciences
Islamabad, Pakistan**

Education

- PhD (2016)
from TU Wien(Technical University of Vienna), Austria.
- PhD Dissertation
Automatic Fault Detection and Diagnosis in buildings energy systems.
- MS in Telematics: Communication Networks and Networked Services (2010)
From NTNU (Norwegian University of Science and Technology), Norway.
- Ongoing Research/Activities:
 - Machine Learning/ Data Analytics
 - Internet of Things (2 PhD students)
 - Energy management in Swarm Robotics (1 PhD student)
 - Deep Reinforcement learning for optimized path selection in swarm robotics
 - Medical Image processing.

Experience

- Academia:

- Associate Professor: FAST-NUCES, ISB campus: (August 2022)
- Assistant Professor: GIKI, Topi, Swabi, Pakistan: (Oct. 2021 to July. 2022)
- Associate Professor/ HoD: FAST-NUCES, CFD campus: (Jan. 2020 to Sept. 2021)
- Assistant Professor: FAST-NUCES, Peshawar campus: (July 2016 to Dec. 2019)
- Assistant Professor: COMSATS University Abbottabad: (July 2012 to June 2016)
- Lecturer : COMSATS University Abbottabad: (August 2006 to June 2012).

- Industry:

- Telenor R & I : Worked on project for identity management (July 2009 to June 2010)
- Austrian Institute of Technology: Worked on Project “**eXtract**” that cost about €1.5 million
- Free Lance Programmer

- Course Title: CS 4002: Applied Programming
- Credits Hours for this course: 3
 - Assignments: [10] % Weightage
 - Semester Project: [10] % Weightage
 - Sessionals : [30] % Weightage
 - Final Exam: [50] % Weightage

Course Contents (1/4)

Week-01	General Introduction + Introduction to Data structures+ Importance of course for program and contents to be covered in the course.
	General Programming Concepts that include pointers+ arrays+ Solving examples
Week-02	Complexity Analysis (Big O, Omega, theta)+Programming Concepts that includes structures, Functions + Accessing structure elements with dot operator and arrow operator + solving examples.
	Abstract Data Types. Row Major and Column Major. Arrangements of Elements from Memory Representation point of view+ Pointers and Arrays, Pointers with Multi-Dimensional Arrays, Arrays of Pointers, Pointers and Strings, Array of Pointers to String Dynamic Memory Allocation using New command.
Week-03	Linked List, Singly Linked Lists and operations on Singly Linked Lists i.e. List creation, Traversal of Linked List (At front and at end)
	Searching, Insertion, Deletion, Display of elements, Reversal of Linked List elements etc.
Week-04	Stack handling, Push () and Pop () Operations on Stack, Application and significance of Stack with daily life examples
	Reversal of String, Checking Validity of an expression containing nested parentheses Polish Notations with Arithmetic Expression

•Course Contents (2/4)

Week-05	Converting Infix Expression into Post Fix and prefix Notation
	Evaluation of Post Fix, Prefix and Infix Expressions+ Converting infix equation to postfix
Week-06	Circular Linked List, operations on Circular Linked Lists i.e. List creation, Traversal, Searching, Insertion, Deletion, Display of elements etc., Sorted Linked Lists and operation
	Operations on Doubly Linked Lists i.e. List creation, Traversal, Searching, Insertion, Deletion, Display of elements, Reversal of Linked List elements
Week-07	Sessional – I
	Introduction to recursion+ Recursive chain + Solving examples.
Week-08	Introduction to Queue data structure, Array and Linked List implementation of Queue. Circular Queue, Operations Add, Delete and Display of the elements of Queue with some daily life examples
	Priority Queue and its operations, DEQueue, ENQueue, Input Restricted and Output Restricted DEQueues and operations of Insertion, Deletion and display of elements of DEQueue

Course Contents (3/4)

Week-09	Introduction to trees+ Basic concepts of trees+ overview of how to implement trees.
	Creating nodes and link them in trees format+ Implementation of trees.
Week-10	Introduction to Trees, Binary Trees, Strictly Binary Trees, Complete Binary Trees, Extended Binary Trees, Linked Representation of Binary Trees with implementation
	Tree Traversal: Depth First traversal (DFS) using Inorder, preorder and postorder traversals of the Binary Tree, Creation of Binary tree from traversals Binary Search tree, Insertion, Deletion operations in Binary Search Tree with implementation.
Week-11	Tree Traversal: Breadth First Search (BFS) using level order traversal of the Binary Tree, Creation of Binary tree from traversals Binary Search tree, Insertion, Deletion operations in Binary Search Tree
	Different cases for deletion in Binary Search tree, i.e. nodes having one child, both children and leaf nodes with implementation
Week-12	Introduction to AVL Tree (Balanced Tree) and significance, inserting elements in AVL tree while maintaining the tree as balance tree using AVL Rotations. The four scenarios of rotations will be discussed along with implementation.
	Heap Sort: Array representation of tree, Full Binary Tree and Complete Binary Tree, Introduction to Heap, Inserting & Deleting Elements in Heap, Heap Sort algorithm, Priority Queues and implementation

•Course Contents (4/4)

Week-13	Introduction to Hashmaps, Importance of Hashmaps, Properties of good hashing function, Issues with Hashmaps (Collisions+ Over flow+ Clustering), How to handle Collisions (Linear Probing)+ Examples
	Solution to different issues of HashMaps. Solution to handle hashmaps+ Linear Probing+ issues in Linear Probing (Clustering) and its solutions+ Quadratic Probing + Solving Examples
Week-14	Solution to handle Collision in Hashmaps using Random Probing, Double hashing+ Closed addressing solutions such as Buckets and Chaining + Implementation and solved examples.
	Graphs and its basics, Directed graphs and undirected graphs, weighted graphs, connected graphs, Cycles, Paths, Simple paths, Implementation of graphs using adjacency matrix and adjacency List+ Examples
Week-15	Graph traversal methods. Breadth First Search (BFS) and Depth First Search (DFS). Examples of both solved + implementation of both mechanisms.
	Shortest Path Algorithm (Dijkstra's Algorithm and Bellman ford algorithm). Examples solved + implementation of the algorithms discussed.
Week-16	Minimum spanning trees (Prim's and Kruskal's algorithm) + Solved examples
	Implementation of Prim's and Krushkul's discussed.

Contact Details

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 - C-513D Office (5th Floor)
- Phone Contact details:
 - Office Extension: _____
 - 0333-5509888 (Please use this number when necessary)
- Office Timing:
 - Will be displayed on office door. (Better to follow)
 - But you can come any time when you find me free 😊
- Email:
 - Usman.habib@nu.edu.pk.