Tribhuvan University
Institute of Science and Technology
Department of Computer Science and Technology

Data Structure and Algorithms Micro-Syllabus

S.No.	Unit	Hours	Total Hours	Marks

1	**Concept and Definition of Data Structures**
	  a. Information and its meaning
	  b. Array in C
	  c. The array as an ADT
	  d. One dimensional array
	  e. Two dimensional array
	  f. Multi-dimensional array
	  g. Structure
	  h. Union
	  i. Pointer
		4	4	5

2	**Algorithm**
	  a. Concept and Definition
	  b. Design of algorithm
	  c. Characteristic of algorithm
	  d. Big O notation
		2	2	3

3	**The Stack**
	  a. Concept and Definition
	     • Primitive Operations
	     • Stack as an ADT
	     • Implementing PUSH and POP operation
	     • Testing for overflow and underflow conditions
		2	8	11

	b. The Infix, Postfix and Prefix
	     • Concept and Definition
	     • Evaluating the postfix operation
	     • Converting from infix to postfix
		3		

	c. Recursion
	     • Concept and Definition
	     • Implementation of:
	       ➢ Multiplication of Natural Numbers
	       ➢ Factorial
	       ➢ Fibonacci Sequences
	       ➢ The Tower of Hanoi
		3		

4	**Queues** a. Concept and Definition	1	4	5

	b. Queue as ADT
	  c. Implementation of Insert and Delete operation of
	     • Linear Queue
	     • Circular Queue
		2		

	d. Concept of Priority Queue	1		
5	**Linked List** a. Concept and Definition		6	8
	b. Inserting and deleting nodes	1		
	c. Linked implementation of a stack (PUSH / POP)	2		

	d. Linked implementation of a queue (Insert / Remove)
	  e. Circular List
	     • Stack as a circular list (PUSH / POP)
		2		

	• Queue as a circular list (Insert / Remove) f. Doubly Linked List (Insert / Remove)	1		

6	**Tree**
	 a. Concept and Definition
	 b. Binary Tree
	 c. Introduction and application
	 d. Operation
	 e. Types of Binary Tree
	     • Complete
	     • Strictly
	     • Almost Complete
	 f. Huffman algorithm
	 g. Binary Search Tree
	     • Insertion
	     • Deletion
	     • Searching
	 h. Tree traversal
	     • Pre-order traversal
	     • In-order traversal
	     • Post-order traversal
		1
		
		 1
		
		 1
		 2
		
		 2
			7	9

7	**Sorting** a. Introduction b. Bubble Sort c. Insertion d. Selection e. Quick f. Merge g. Comparison and Efficiency of sorting	2 2 1	5	7
8	**Searching** a. Introduction b. Sequential Searching c. Binary Search d. Comparison and Efficiency of Searching e. Hashing • Probing (Linear and Quadratic)	2 2 1	5	7

9	**Graph**
	 a. Introduction
	 b. Representation of Graph
	     • array
	     • linked list
	 c. Traversal
	     • Depth First Search
	     • Breadth First Search
	 d. Minimum spanning Tree
	     • Kruskal's algorithm
		1
		
		 2
		
		 1
			4	5

Text Book:
Data Structures using C and C++, Y. Langsam, M. J. Augenstein, A. M. Tenenbaum

Reference Book:
The Design and Analysis of Algorithm, Nitin Upadhyay, SK Kataria & Sons

Prerequisite: C