Indian Institute of Information Technology, Allahabad

Department of Information Technology

Course Syllabus A Template

1. Name of the Course: Advanced Data Structures and Algorithms

2. LTP structure of the course: 2-1-1 (*ie*, L-2, T-1, P-1)

3. Objective of the course: To covers analysis and design of data structures and engages learners to use data structures as tools to algorithmically design efficient computer programs that will cope with the complexity of actual applications.

4. Outcome of the course: Students successfully completing this course will be able to:

- explain the need for efficiency in data structures and algorithms.
- apply methods to analyze running time of essential data structures and estimate efficiency of the algorithms and implementations.
- understand and apply the concept of abstract data type to represent and implement heterogeneous data structures.

5. Course Plan:

Component	Unit	Topics for Coverage
Component 1	Unit 1	Introduction to Data Structures Introduction to Computing complexity of operations on data structures Linear Data Structures : Stacks, Queues, Circular Queues Array-Based and LinkedList based represenation
	Unit 2	Binary Trees and Search Trees Scapegoat Trees Red-Black Trees
Component 2	Unit 3	Sets and Their representations Operations on Sets Strings : Representation and opertions Compression and Encoding
	Unit 4	Graphs: Representation and Traversal Graph Algorithms : All source shortest paths, Transitive closure Max-flow - Min-Cut

6. Text Book:

7. References:

a. Data Structures Using C and C++ by *Yedidyah Langsam, Moshe J. Augenstein* and *Aaron M. Tenenbaum*, Pearson

b. Introduction to Algorithms (Ed 3) by *TH Cormen, CE Leiserson, RL Rivest* and *C Stein*, MIT Press

c. Algorithms + Data Structures = Programs by Niklaus Wirth, PHI Learning