

Subject Code	Subject Name	Credits
26CS002	DATA STRUCTURES USING PYTHON	4

Course Objectives:

1. Implement Object Oriented Programming concepts in Python.
2. Understand Lists, Dictionaries in Python.
3. Understanding how searching and sorting is performed in Python.
4. Understanding how linear and non-linear data structures works.

Learning Objectives:

On successful completion of the course, students will be able to:

1. Examine Python syntax and semantics and apply Python flow control and functions.
2. Create, run and manipulate Python Programs using core data structures like Lists.
3. Apply Dictionaries and use Regular Expressions.
4. Interpret the concepts of Object-Oriented Programming as used in Python.
5. Master object-oriented programming to create an entire python project using objects and classes

Unit 1 - OOPS CONCEPTS (12 hrs.):

Classes and Object, constructors, types of variables, types of methods. Inheritance: single, multiple, multi-level, hierarchical, hybrid, Polymorphism: with functions and objects, with class methods, with inheritance, Abstraction: abstract classes.

Unit 2 - DATA STRUCTURES (12 hrs.):

Definition, Linear Data Structures, Non-Linear Data Structures. Python specific data structures: List, Tuples, Set, Dictionaries, Comprehensions and its Types, Strings, slicing.

Unit 3 - ARRAYS, SEARCHING & SORTING (12 hrs.):

Overview, Types of Arrays, Operations on Arrays, Arrays vs List. Linear Search and Binary Search. Bubble Sort, Selection Sort, Insertion Sort, Merge Sort, Quick Sort.

Unit 4 - LINEAR DATA STRUCTURES (12 hrs.):

Overview of Stack, Implementation of Stack (List & Linked list), Applications of Stack. Overview of Queue, Implementation of Queue (List & Linked list), Applications of Queues, Priority Queues. Implementation of Singly Linked Lists, Doubly Linked Lists, Circular Linked Lists

Unit 5 - NON-LINEAR DATA STRUCTURES (12 hrs.):

Graphs -Introduction, directed vs Undirected Graphs, Weighted vs. Unweighted Graphs, Representations, Breadth First Search, Depth First Search. Trees - Overview of Trees, Tree Terminology, Binary Trees: Introduction, Implementation, Applications. Tree Traversals, Binary Search Trees: Introduction, Implementation.

Reference Books:

1. Data structures and algorithms in python by Michael T. Goodrich
2. Data Structures and Algorithmic Thinking with Python by Narasimha Karumanchi
3. Data Structures and Algorithms with Python – Kent D. Lee & Steve Hubbard
4. Data Structures with Python Get familiar with the common Data Structures and Algorithms – Dr. Harsh Bhasin
5. Python Data Structures and Algorithms – Benjamin Baka