

# Course: Programming, Data Structures and Algorithms using Python

**Course Code:** noc17-cs10

**Session:** 2016-17

**Duration:** 8 Weeks

**Assessment procedures:** Weekly Assignment (25%) + proctored certification Exam (75%)

## Curriculum of the Course:

Week 1:

- Informal introduction to programming, algorithms and data structures via gcd, Downloading and installing Python, gcd in Python: variables, operations, control flow - assignments, conditionals, loops, functions.

Week 2:

- Python: types, expressions, strings, lists, tuples, Python memory model: names, mutable and immutable values, List operations: slices etc., Binary search, Inductive function definitions: numerical and structural induction, Elementary inductive sorting: selection and insertion sort, In-place sorting

Week 3:

- Input-Output Handling in Java
- Basic algorithmic analysis: input size, asymptotic, complexity,  $O()$  notation, Arrays vs lists, Merge sort, Quicksort, Stable sorting

Week 4:

- Dictionaries, More on Python functions: optional arguments, default values, Passing functions as arguments, Higher order functions on lists: map, iter, list comprehension

Week 5:

- Exception handling, Basic input/output, Handling files, String processing.

Week 6:

- Backtracking: N Queens, recording all solutions, Scope in Python: local, global, nonlocal names, Nested functions, Data structures: stack, queue, Heaps

Week 7:

- Abstract datatypes, Classes and objects in Python, "Linked" lists: find, insert, delete, Binary search trees: find, insert, delete, Height-balanced binary search trees.

Week 8:

- Efficient evaluation of recursive definitions: memorization, Dynamic programming: examples, Other programming languages: C and manual memory management, Other programming paradigms: functional programming.

## List of students enrolled

| S. No. | Name of Student |
|--------|-----------------|
| 1.     | Prateek Agarwal |