NOC:Programming, Data Structures and Algorithms in Python - Video course

NPTEL

http://nptel.ac.in

Computer Science and Engineering

Pre-requisites:

School level mathematics.

Coordinators:

Prof. Madhavan Mukund
Chennai Mathematical Institute

COURSE DETAIL

Week	Lessons/Topics
Week 1	Informal introduction to programmin, algorithms and data structures viagcd Downloading and installing Python gcd in Python: variables, operations, control flow - assignments, condition-als, 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 denitions: numerical and structural induction Elementary inductive sorting: selection and insertion sort In-place sorting
Week 3	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, lter, 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
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	Effcient evaluation of recursive denitions: memoization Dynamic programming: examples Other programming languages: C and manual memory management Other programming paradigms: functional programming

References:

Dive into Python 3, Mark Pilgrim, http://www.diveintopython3.net/
Think Python, 2nd Edition, Allen B. Downey, http://greenteapress.com/wp/think-