INTRODUCTION TO ALGORITHMS AND ANALYSIS

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TYPE OF COURSE : Rerun | Elective | UG/PG
COURSE DURATION : 12 weeks (20 Jul’ 20 - 9 Oct’ 20)
EXAM DATE : 17 Oct 2020

PRE-REQUISITES : Nil
INTENDED AUDIENCE : Computer Science
INDUSTRIES APPLICABLE TO : IT Companies

COURSE OUTLINE :
This course provides an introduction to mathematical modeling of computational problems. It covers the common algorithms, algorithmic paradigms, and data structures used to solve these problems. The course emphasizes the relationship between algorithms and programming, and introduces basic performance measures and analysis techniques for these problems.

ABOUT INSTRUCTOR :
Dr. Sourav Mukhopadhyay is an associate professor at Indian Institute of Technology Kharagpur. He has completed his B.Sc (Honours in Mathematics) in 1997 from University of Calcutta, India. He has done M.Stat (in statistics) and M.Tech (in computer science) from Indian Statistical Institute, India, in 1999 and 2001 respectively. He worked with Cryptology Research Group at Indian Statistical Institute as a PhD student and received his Ph.D. degree in Computer Science from there in 2007. He was a Research Assistant at the Computer Science department of School of Computing, National University of Singapore (NUS). He visited InriaRocquencourt, project CODES, France and worked as a post-doctoral research fellows at the School of Computer Engineering, Nanyang Technological University (NTU), Singapore. He was a post-doctoral research fellows and a part time Lecturer with School of Electronic Engineering, Dublin City University (DCU), Ireland.

COURSE PLAN :
Week 1: Time Complexity, Insertion Sort, Merge Sort.
Week 2: Divide and Conquer
Week 3: QuickSort, HeapSort
Week 4: Linear-time Sorting
Week 5: Order Statistics & Hashing
Week 6: Balanced Binary Search Tree
Week 7: Augmenting Data Structures & Computational Geometry
Week 8: Dynamic Programming Problems & Graphs
Week 9: Shortest Path Problem
Week 10: All-pairs Shortest Paths, BFS & DFS
Week 11: Fixed-Universe Successor problem & Amortized Algorithms
Week 12: Network Flow, NP problems