



# FUNDAMENTAL ALGORITHMS: DESIGN AND ANALYSIS

## **PROF. SOURAV MUKHOPADHYAY**

Department of Computer Science  
IIT Kharagpur

**INTENDED AUDIENCE:** Core, UG /PG, B.Tech/B.E./M.Tech/M.Sc.

**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 :**

Prof. 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 Inria Rocquencourt, 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:** Insertion Sort, Asymptotic Notation, Merge Sort, QuickSort, Divide and Conquer

**Week 2:** Heap Sort, Linear-time Sorting, Order Statistics

**Week 3:** Hashing, BST Sort, Augmenting Data Structures, Dynamic Programming

**Week 4:** Graphs : BFS, DFS, Prim's, Shortest Paths