



# DATA STRUCTURE AND ALGORITHMS USING JAVA

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**TYPE OF COURSE** : New | Elective | UG**COURSE DURATION** : 12 weeks (20 Jul' 20 - 9 Oct' 20)**EXAM DATE** : 18 Oct 2020

**PRE-REQUISITES** : This course requires that the students are familiar with programming language such as C/C++/Java, data structures and algorithms.

**INTENDED AUDIENCE** : The undergraduate students from the engineering disciplines, namely CSE, IT, EE, ECE, etc. might be interested for this course.

**INDUSTRIES APPLICABLE TO** : All IT companies.

**COURSE OUTLINE :**

With the growth of Information and Communication Technology, there is a need to develop large and complex software. For developing large software, software developers should have enough proficiency of data structures and algorithms. Further, those software should be platform independent, Internet enabled, easy to modify, secure, and robust. To meet this requirement object-oriented paradigm has been developed and based on this paradigm the Java programming language emerges as the best programming environment. Now, Java programming language is being used for mobile programming, Internet programming, and many other applications compatible to distributed systems. This course aims to cover the essential topics of data structures and algorithms and how the same can be implemented using Java programming language. The participants of the proposed course will be able to improve their skills, to cope with the current demand of IT industries and solve many problems in their own field of studies.

**ABOUT INSTRUCTOR :**

Dr. Debasis Samanta has a vast experience in the field of software development, human computer interaction, data analytics and artificial intelligence and allied fields. He is presently working as Associate Professor with Department of Computer Science & Engineering at IIT Kharagpur. He has published two very popular books on data structures and object-oriented programming with C++ and Java. His MOOC online courses on Soft Computing and Programming in Java have been appreciated by many participants, which include faculty members and students from different colleges in India. He has published many research works in peer-reviewed journals and proceedings of international conferences. He has supervised many doctoral theses as well as post graduate students projects.

**COURSE PLAN :**

**Week 1:** 1D array, list and vector, 2D matrices and tables of objects

**Week 2:** Java implementation of 1D and 2D arrays and its operations

**Week 3:** Linked lists and its various operations, stack and queue

**Week 4:** Java implementation of linked lists, stack and queue

**Week 5:** Binary trees: Representation and operations. Variations of binary tree: Binary search tree, Height balanced search tree, Heap tree

**Week 6:** Java implementation of binary trees and its variations

**Week 7:** Graph : Structure, representation and operations

**Week 8:** Java implementations of graph data structures

**Week 9:** Algorithms (Part-I): Searching and sorting algorithms

**Week 10:** Java implementation of Part-I algorithms

**Week 11:** Algorithms (Part-II): Greedy algorithms, shortest path algorithms

**Week 12:** Java implementation of Part-II algorithms