DATA STRUCTURE AND ALGORITHM
1st Term EMBA (XIMB)
(Session 2019-20)

COURSE INFORMATION:

Instructor	: Dr. Rudra Mohan Tripathy School of Computer Science & Engineering Xavier University Bhubaneswar
Office Location	: Room No-405, Computer Lab-6, 4th Floor, New Building
Office Phone	: 3341
Meeting Hour	: by Appointment
E-mail	: rudramohan@xub.edu.in
Lecture Time	: As per timetable

OBJECTIVES:

1. Demonstrate a familiarity with major algorithms and data structures.
2. Master the use of appropriate data structures for representing, organizing, and manipulating data.
3. Develop the skill of problem-solving using data structures such as linear lists, stacks, queues, hash tables, binary trees, heaps, binary search trees, and graphs and writing programs for these solutions.
4. Understand different techniques of solving problems.
5. Apply important algorithmic design paradigms and methods of analysis.
6. Synthesize efficient data structure in common engineering design situation.

PREREQUISITE:

Basic Knowledge of Computer Programming

MAJOR TOPICS:

1. **Introduction** and Classification of Data Structure, Complexity of Algorithms: Asymptotic Notations (Big O, Omega, Theta) and Growth of Function
2. **Elementary data-structures**: arrays, lists, queues, stacks and their applications.
3. **Basic Sorting Techniques**: Bubble, Selection, Insertion Sort and Radix Sort
4. **Advance Sorting** Techniques: Merge Sort, Quick Sort and Heap Sort
5. **Searching Techniques**: Linear Search and Binary Search
6. **Tree**: Binary trees, Binary-search-tree data-structure. Balanced binary-search-tree: Red-Black trees.
7. **Hashing Techniques** and Hash functions, Collision, Resolution Techniques: Open Addressing, Chaining.
8. **Graph**: Definition, Terminology, Representation of Graph: Adjacency Matrix, Adjacency List, Representation of Graph: Incidence Matrix, Path Matrix, Graph Traversal Algorithm: Breadth first Search (BFS), Graph Traversal Algorithm: Depth first search (DFS), Shortest Path Algorithm (Warshall's Algorithm).
9. **String Matching**: Naïve, Rabin-Karp (If time permit)

LEARNING OUTCOMES:

On completion of this course successful, students will be able to:

1. Student will be able to choose appropriate data structure as applied to specified problem definition.
2. Students will be able to use linear and non-linear data structures like stacks, queues, linked list etc.
3. Student will be able to handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.
4. Make comparative study of comparison-based sorting techniques
5. Identify techniques to design algorithms and measure their efficiency.

TEXT BOOKS:

1. Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser, " Data Structures and Algorithms in Python", Willy
2. Thomas H. Cormenn, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein: "Introduction to Algorithms", 3rd Edition, PHI.

REFERENCE BOOKS:

1. Mark Allen Weiss, "Data Structures and Algorithms in C", 8th Indian Edition, Pearson.
2. Seymour Lipschutz, "Schaum's Outlines Data Structure", Special Indian Edition, McGraw-Hill.
3. Aho, Hopcroft, Ullman, "Data Structure and Algorithms", First Edition, Pearson Education Inc.

COMPONENTS OF EVALUATION:

Sl. No	Components	Weightage
1	Quiz	10%
2	Assignment	20%
3	Mid-Semester Examination	30%
4	End-Semester Examination	40%

POLICIES:

- All assignments will be due at the beginning of the class on the due date. No late submissions will be accepted unless a valid excuse is given to the instructor by the day prior to the due date.
- You are expected to attend all classes. If you miss a class, you are responsible for finding out the material covered in that class. If you miss an exam, a grade of zero will be assigned, unless a valid excuse is given.
- All assignments are expected to be done by each student individually. Verbal and informal exchange of ideas is permitted, indeed encouraged. However, written solution should NOT be shown to another student or copied from another student. Any act of academic dishonesty will result in an F grade.