IT623 – Algorithms and Data Structures (3-0-2-4)
Program/Semester: MSc (IT)/Winter semester 2011-12
Category: Core

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Course Objectives
The objective of the course is to introduce the concept of data structures, algorithm analysis, and implementations of some structures through object oriented concepts using C++.
After completion of this course, the student will be able to:
- apply suitable ADTs in computer programs and applications;
- measure performance of data structures and algorithm design;
- choose the appropriate data structure and algorithm for intended application;
- solve problems (and write programs) using arrays, lists, stacks, queues, hash tables, trees, graphs and Greedy algorithms.

Contents
- Asymptotic notations: Growth rates, Algorithm analysis, Performance measurement;
- Abstract data types (ADTs): lists, stacks, queues, trees, graphs.
- Sorting algorithm: selection, insertion, bubble, quick, merge sorts.
- Trees: Binary, AVL, 2-4; Red-Black; binary search, heaps, tree traversal.
- Hashing; Topological ordering;
- Graphs: depth-first-search, breadth-first-search, spanning tree.
- Greedy algorithms, dynamic programming.

Texts
- Data Structures and Algorithms in C++ -- Goodrich, Tamassia, Mount [Wiley]
- Introduction to Algorithms -- Cormen, Leiserson, Rivest, Stein [PHI]
- Data Structures and Algorithm Analysis in C++ -- Weiss [Pearson]

Evaluation Methodology
- First In-semester exam: 20%
- Lab exam/project: 20%
- Assignments/Quizzes/Class participation: 20%
- End-semester exam: 40%