Title	**Data Structures and Algorithms**
Code	**CMP-410**
Credit Hours	3
Category	Computing
Prerequisite	CMP-342: Object Oriented Programming
Co-Requisite	None
Follow-up	CMP-412: Analysis of Algorithms
Course Description	**Topics:** Introduction: Introduction to Course, Review of Object Oriented Programming Concepts. Algorithm Specification: Properties of Algorithm, examples, performance, analysis, measurement, and Big Oh notation. Introduction to ADTs: Array and Polynomial as an ADT, Sparse Matrices, and Representation of Arrays, The Stack ADT, Expressions, Postfix Notation, and Infix to postfix conversion. Recursion: Recursive Definition and Processes, Writing Recursive Programs. Queue: The Queue ADT, Circular and Double Ended Queue. Self-Referencing Classes and Dynamic Memory Allocation. Linked List: Singly Linked Lists, Circular Lists, Linked Stacks and Queues (Double Ended List), Doubly Linked Lists. Trees: Introduction to Trees, Logical construction and Traversing of Binary Trees, Implementation of Binary Trees (Insertion and Traversing), Searching and deletion in Binary Trees, Binary Search Tree, Introduction to Balanced and AVL Trees. Heaps: Heaps and Heaps as Priority Queues, Double Ended Priority Queue. Searching: Linear Search, Binary Search, and Types of Indexing. Hashing: Hash Functions: Division; Overflow Handling: Chaining; Introduction to other advanced topics like:, B-Trees, Generalized List, etc. Sorting types and Techniques: Logical and Algorithmic Implementation of Selection, Bubble, Insertion, Shell, Radix, Merge, Quick, Heap, and Tree sorts. Graphs: Graph terminology, Adjacency List and Adjacency Matrix and Adjacency list representation of Graph; Elementary Graph Operations: Breadth First Search and Depth First Search, Spanning Trees (BFSST, DFSST).
Text Book(s)	1. Ellis Horowitz, Sartaj Sahni, D. Mehta, Fundamentals of Data Structures in C++, 2nd Ed., Computer Science Press, 1995. ISBN 81-7808-792-8 2. Adam B. Drozdek, Data Structure and Algorithm in C++, 4th Ed., Cengage Learning, ISBN 978-1133608424
Reference Material	1. D. Samanta, Classic Data Structures, Prentice Hall, 2001, ISBN: 812033731X. 2. Mark Allen Weiss, Data Structure and Algorithms in C++, 2nd Ed., Pearson Education, ISBN 81-7758-943-1. 3. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, Introduction to Algorithms, 2nd Ed, MIT Press, 2001, ISBN 0-07-013151-1. 4. Reference from different books enlisted in reference material will be given as required or lecture notes for reading will be provided.