

<b>Title</b>	<b>Data Structures and Algorithms</b>
<b>Code</b>	<b>CMP-410</b>
<b>Credit Hours</b>	3
<b>Category</b>	Computing
<b>Prerequisite</b>	CMP-342: Object Oriented Programming
<b>Co-Requisite</b>	None
<b>Follow-up</b>	CMP-412: Analysis of Algorithms
<b>Course Description</b>	<p><b>Topics:</b> 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).</p>
<b>Text Book(s)</b>	<ol style="list-style-type: none"> <li>1. Ellis Horowitz, Sartaj Sahni, D. Mehta, Fundamentals of Data Structures in C++, 2<sup>nd</sup> Ed., Computer Science Press, 1995. ISBN 81-7808-792-8</li> <li>2. Adam B. Drozdek, Data Structure and Algorithm in C++, 4<sup>th</sup> Ed., Cengage Learning, ISBN 978-1133608424</li> </ol>
<b>Reference Material</b>	<ol style="list-style-type: none"> <li>1. D. Samanta, Classic Data Structures, Prentice Hall, 2001, ISBN: 812033731X.</li> <li>2. Mark Allen Weiss, Data Structure and Algorithms in C++, 2<sup>nd</sup> Ed., Pearson Education, ISBN 81-7758-943-1.</li> <li>3. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, Introduction to Algorithms, 2<sup>nd</sup> Ed, MIT Press, 2001, ISBN 0-07-013151-1.</li> <li>4. Reference from different books enlisted in reference material will be given as required or lecture notes for reading will be provided.</li> </ol>