

Computer Networking Track

Semester 4

Data Structures and Algorithms

3 Credit Hours

Objectives

This course is designed to teach students structures and schemes, which allow them to write programs to efficiently manipulate, store, and retrieve data. "An apprentice carpenter may want only hammer and saw, but a master craftsman employs many precision tools". Computer programming likewise requires sophisticated tools to cope with complexity of real applications and only practice with these tools will build skill in their use. This subject deals to make students convenient in building a memory and time efficient data structures for the implementation of large-scale (data intensive) computer systems. The following topics will be covered in the course: Introduction to Data Structures and Algorithms, Review of Object Oriented Programming Concepts, Algorithm Specification, Big Oh notation, Introduction to ADTs, Sparse Matrices, Stack, Recursion, Queue, Circular and Double Ended Queue, Self-Referencing Classes and Dynamic Memory Allocation, Singly Linked Lists, Doubly Linked Lists, Binary Search Tree, Introduction to Balanced and AVL Trees, Heaps, Searching, Hashing, Overflow Handling, Dynamic Hashing, Sorting types and Techniques (Selection, Bubble, Insertion, Shell, Radix, Merge, Quick, Heap, and Tree sorts), Graphs, Adjacency List and Adjacency Matrix, Breadth First Search and Depth First Search, Spanning Trees (BFSST, DFSST), Standard Template Library.

Prerequisites

Object Oriented Programming

Text Book

- Horowitz, Sahni, and Mehta, *Fundamentals of Data Structures in C++*, Computer Science Press, 2nd Edition 2006.

Reference Material

- Tanenbaum, M. Augenstein, and Y. Lang Sam, "Data Structures using C and C++" 2nd Ed., Prentice Hall, 1999, ISBN-10: 0130369977
- A. Drozdek, *Data Structures and Algorithms in C++*, 3rd Edition, Course Technology, 2005.
- L. Nyhoff, *ADTs, Data Structures, and Problem Solving with C++*, 2nd Edition, Prentice Hall, 2005.
- M.A. Weiss, *Data Structures and Algorithm Analysis in C++*, 3rd Edition, Addison-Wesley, 2007.
- Frank M. Carrano, Paul Helman, Robert Veroff, *Data Abstraction and Problem Solving with C++*, 2nd edition, Addison-Wesley, 1998. ISBN-10: 0201874024
- Standish, *Data Structures in JAVA*, Addison Wesley, 2000, ISBN-10: 020130564X
- Robert L. Kruse, *Data Structure and Program Design*, ISBN-10: 0137689950

Data Structures and Algorithms Lab

1 Credit Hours

Relevant to the above topics
