Course Description

The Unordered Data Structures course covers the data structures and algorithms needed to implement hash tables, disjoint sets and graphs. These fundamental data structures are useful for unordered data. For example, a hash table provides immediate access to data indexed by an arbitrary key value, that could be a number (such as a memory address for cached memory), a URL (such as for a web cache) or a dictionary. Graphs are used to represent relationships between items, and this course covers several different data structures for representing graphs and several different algorithms for traversing graphs, including finding the shortest route from one node to another node. These graph algorithms will also depend on another concept called disjoint sets, so this course will also cover its data structure and associated algorithms.

Skills

Students should be familiar with programming already. This course uses the C++ language. If students do not have prior experience with C++, it is **highly** recommended that students take the first two courses in this course sequence, "Object-Oriented Data Structures in C++" and "Ordered Data Structures," before attempting this course. The first course also explains how to set up the working environment for attempting the course projects. Students should also be proficient at the basic operation of a computer system and be able to download, install and update software.

Course Goals and Objectives

Upon completing the course, the learner will be able to:

- Implement classic and adapted data structures and algorithms for hash tables, disjoint sets and graphs,
- Develop software using the C++ Standard Library implementations of these data structures and algorithms,
- Analyze the efficiency of implementation choices of data structures and algorithms for hash tables, disjoint sets and graphs,
- Decompose a real-world problem into its supporting data structures, and
- Diagnose appropriate approaches or algorithms to solve problems involving graph search and associative memory.

Textbook and Readings