**Pseudocode to open a file read and check for file errors:**

open a file.

check for the return value of the open function.

if it is "-1":

File not found.

else:

file found.

Reading the file:

the file can be read using getline.

and print using cout, or printf.

using a loop set to a condition of EOF.

**Pseudocode for a menu:**

Load file

Print course list

Print course

Exit

Ask user “what would you like to do?”

**Pseudocode to print out courses in the Computer Science program in alphanumeric order:**

Print sample Schedule.

CSCI100, Introduction to Computer Science

CSCI101, Introduction to Programming in C++

CSCI200, Data Structures

CSCI301, Advance Programming in C++

CSCI300, Introduction to Algorithms

CSCI350, Operating Systems

CSCI400, Large Software Development

MATH201, Discrete Mathematics

Ask user “what course do you want to know about?”

**Vectors advantages:**

1. Vector is not fixed sized data structure and can be grown.
2. Traversing is efficient and fast as we make use of CPU cache as these are laid out contiguously in memory.

**Vectors disadvantages:**

1. The insertion or deletion in front of array takes more time as items needs to be moved toward end of vector.
2. It doesn’t work efficiently if the data size is too big as only traversing gives constant time but other operation becomes costly.

**Hash Tables advantages:**

1. Insertion and lookup can be performed in constant time.
2. Quick search is possible.

**Hash Tables disadvantages:**

1. Implementation is difficult.

**Tree advantages:**

1. Less space is required as large array allocation is not needed.
2. Easy to implement.

**Tree disadvantages:**

1. Insertion and lookup take comparatively more time. Both takes O(log n) time for average case.

**Vector Sorting**

Insertion sort: O(n^2)

Selection sort: O(n^2)

Quick sort: O(n^2)

**Binary search tree**

Remove Operation: O(height)

Insert Operation: O(height)

Search Operation: O(height)