Open the file containing the course information and their prerequisites

Load the file and separate all courses into separate objects

Link the objects together based on prerequisites

Store the courses as individual objects and link them to their prerequisite courses

Check for formatting errors

Create menu of options that execute based on user input

Sort the courses alphanumerically and print out the list of courses

Create loop that checks all of the course names and sorts them alphanumerically

Search for a specific course and print that course and its prerequisites

Create function that locates the specific course and prints it and its prerequisites

Exit the program

Create ability to leave the menu and loop by ending the program

| **Code** | **Line Cost** | **# Times Executes** | **Total Cost** |
| --- | --- | --- | --- |
| **for all courses** | 1 | n | n |
| **if the course is the same as courseNumber** | 1 | n | n |
| **print out the course information** | 1 | 1 | 1 |
| **for each prerequisite of the course** | 1 | n | n |
| **print the prerequisite course information** | 1 | n | n |
| **Total Cost** | | | 4n + 1 |
| **Runtime** | | | O(n) |

There are three data structures including Vector, Hash Table, and Tree. Vector will execute lines for each course and its prerequisite course, so it would be the slowest. Hash table uses linear probing and would be the second fastest. Tree can cut the search value in half and would be the fastest and would be the data structure I would recommend out of the three.