## Example Runtime Analysis

When you are ready to begin analyzing the runtime for the data structures that you have created pseudocode for, use the chart below to support your work. This example is for printing course information when using the vector data structure. As a reminder, this is the same pairing that was bolded in the pseudocode from the first part of this document.

**Vector Data Structure**

**void printCourseInformation(Vector<Course> courses, String courseNumber)**

| **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)** |

**int numPrerequisiteCourses(Vector<Course> courses, Course c)**

| **Code** | **Line Cost** | **# Times Executes** | **Total Cost** |
| --- | --- | --- | --- |
| **totalPrerequisites = prerequisites of course c** | **1** | **1** | **1** |
| **for each prerequisite p in totalPrerequisites** | **1** | **n** | **n** |
| **add prerequisites of p to totalPrerequisites** | **1** | **n** | **n** |
| **print number of totalPrerequisites** | **1** | **1** | **1** |
| **Total Cost** | | | **2n+2** |
| **Runtime** | | |  |

**void printSampleSchedule(Vector<Course> courses)**

| **Code** | **Line Cost** | **# Times Executes** | **Total Cost** |
| --- | --- | --- | --- |
| **bool coursePreReq = false** | **1** | **1** | **1** |
| **for all courses** | **1** | **n** | **n** |
| **print out the course name** | **1** | **1** | **1** |
| **if coursePreReq = true** | **1** | **1** | **1** |
| **for each prerequisite** | **1** | **n** | **n** |
| **print prerequisite** | **1** | **n** | **n** |
| **Total Cost** | | | **3n+3** |
| **Runtime** | | |  |

**Hashtable Data Structure**

**int numPrerequisiteCourses(Hashtable<Course> courses)**

| **Code** | **Line Cost** | **# Times Executes** | **Total Cost** |
| --- | --- | --- | --- |
| **prereqTotal =**  **HashTable[courses]** | **1** | **1** | **1** |
| **for each prerequisite p in prereqTotal** | **1** | **n** | **n** |
| **add prerequisites in HashTable [p] to prereqTotal** | **1** | **n** | **n** |
| **print prereqTotal** | **1** | **1** | **1** |
| **Total Cost** | | | **2n+2** |
| **Runtime** | | |  |

**void printSampleSchedule(Hashtable<Course> courses)**

| **Code** | **Line Cost** | **# Times Executes** | **Total Cost** |
| --- | --- | --- | --- |
| **for all key value pair in courses** | **1** | **n** | **n** |
| **print key course** | **1** | **1** | **1** |
| **if key value has prerequisites** | **1** | **n** | **n** |
| **for each prerequisite** | **1** | **n** | **n** |
| **print prerequisite** | **1** | **n** | **n** |
| **Total Cost** | | | **4n+1** |
| **Runtime** | | |  |

**void printCourseInformation(Hashtable<Course> courses, String courseNumber)**

| **Code** | **Line Cost** | **# Times Executes** | **Total Cost** |
| --- | --- | --- | --- |
| **for all courses** | **1** | **n** | **n** |
| **if course matches courseNumber** | **1** | **n** | **n** |
| **print out the course information** | **1** | **n** | **n** |
| **for each prerequisite in HashTable[courses]** | **1** | **n** | **n** |
| **print prerequisite course information** | **1** | **n** | **n** |
| **Total Cost** | | | **5n** |
| **Runtime** | | |  |

**Tree Data Structure**

**int numPrerequisiteCourses(Tree<Course> courses)**

| **Code** | **Line Cost** | **# Times Executes** | **Total Cost** |
| --- | --- | --- | --- |
| **prereqTotal = child left & child right of Node courses** | **1** | **1** | **1** |
| **for each prerequisite p in prereqTotal** | **1** | **n** | **n** |
| **add child left & right of Node p to prereqTotal** | **1** | **n** | **n** |
| **print prereqTotal** | **1** | **1** | **1** |
| **Total Cost** | | | **2n+2** |
| **Runtime** | | |  |

**void printSampleSchedule(Tree<Course> courses)**

| **Code** | **Line Cost** | **# Times Executes** | **Total Cost** |
| --- | --- | --- | --- |
| **for all Node courses** | **1** | **n** | **n** |
| **print course name** | **1** | **n** | **n** |
| **if course has left child node** | **1** | **n** | **n** |
| **print left child node as prerequisite** | **1** | **n** | **n** |
| **if course has right child node** | **1** | **n** | **n** |
| **print right child node as prerequisite** | **1** | **n** | **n** |
| **Total Cost** | | | **6n** |
| **Runtime** | | |  |

**void printCourseInformation(Tree<Course> courses, String courseNumber)**

| **Code** | **Line Cost** | **# Times Executes** | **Total Cost** |
| --- | --- | --- | --- |
| **for all Nodes** | **1** | **n** | **n** |
| **if course and courseNumber match** | **1** | **n** | **n** |
| **print Node information** | **1** | **n** | **n** |
| **if course has left child Node** | **1** | **n** | **n** |
| **print left child Node as perquisite course information** | **1** | **n** | **n** |
| **if course has right child Node** | **1** | **n** | **n** |
| **print right child Node as prerequisite course information** | **1** | **n** | **n** |
| **Total Cost** | | | **7n** |
| **Runtime** | | |  |