**Runtime Analysis:**

**Reading File and Creating Course Object**

| **Vector** | **Line Cost** | **# Times Executes** | **Total Cost** |
| --- | --- | --- | --- |
| Create Vector | 1 | 1 | 1 |
| For Each Line in File | 1 | n | n |
| Create Course Item | 1 | n | n |
| While Prereq Exists | 1 | n | n |
| Append Prereq | 1 | n | n |
| Push.back course item | 1 | n | n |
| **Total Cost** | | | 5n + 1 |
| **Runtime** | | | O(n) |

| **Hashtable** | **Line Cost** | **# Times Executes** | **Total Cost** |
| --- | --- | --- | --- |
| Create Hashtable | 1 | 1 | 1 |
| HashTable::Insert() | 6 | n | n |
| Create key for course |  |  |  |
| If no Entry at Key |  |  |  |
| Assign Node |  |  |  |
| Else |  |  |  |
| Find next open node |  |  |  |
| Append Prereq |  |  |  |
| LoadCourseInfo() | 4 | n | n |
| Create course item |  |  |  |
| While Prereq exists |  |  |  |
| Append Prereq |  |  |  |
| Insert Course Item |  |  |  |
| **Total Cost** | | | 11n + 1 |
| **Runtime** | | | O(n) |

| **Tree** | **Line Cost** | **# Times Executes** | **Total Cost** |
| --- | --- | --- | --- |
| Create BinarySearchTree() | 8 | n | n |
| If root is Null |  |  |  |
| Add root |  |  |  |
| If newNode < root |  |  |  |
| If left node null |  |  |  |
| newNode becomes left |  |  |  |
| If newNode > root |  |  |  |
| If right node null |  |  |  |
| newNode become right |  |  |  |
| LoadCourseInfo() | 4 | n | n |
| Create course item |  |  |  |
| While Prereq exists |  |  |  |
| Append Prereq |  |  |  |
| Insert Course Item |  |  |  |
| **Total Cost** | | | 12n + 1 |
| **Runtime** | | | O(n) |