***Runtime Analysis***

| ***Vector*** | ***Line Cost*** | ***#Times executes*** | ***Total Cost*** |
| --- | --- | --- | --- |
| for all courses | 1 | n | n |
| if courseLine equals 0 | 1 | n | n |
| add new courseID | 1 | n | n |
| if courseLine equals 1 | 1 | n | n |
| add new courseName | 1 | n | n |
| if courseLine size is greater than 2 | 1 | n | n |
| if the element within courseLine is not equal to the courseID | 1 | n | n |
| print “no prerequisites found” | 1 | n | n |
| else attach prerequisite | 1 | n | n |
| ***Total Cost*** | | | 8n + 1 |
| ***Runtime*** | | | O(n) |

| ***Hash Table*** | ***Line Cost*** | ***#Times executes*** | ***Total Cost*** |
| --- | --- | --- | --- |
| create hash table | 1 | 1 | 1 |
| insert key, value | 0 | 0 | 0 |
| while current item is empty | 1 | n | n |
| if the table count is the same as the table size | 1 | n | n |
| free up item space | 1 | n | n |
| increase table count | 1 | n | n |
| if value is first or second | 1 | n | n |
| use temp value to hold first and second values | 1 | n | n |
| else if third value | 1 | n | n |
| add to existing value | 1 | n | n |
| ***Total Cost*** | | | 8n + 1 |
| ***Runtime*** | | | O(n) |

| ***Tree*** | ***Line Cost*** | ***#Times executes*** | ***Total Cost*** |
| --- | --- | --- | --- |
| if the root is null | 1 | 1 | 1 |
| set the current course equal to root | 1 | 1 | 1 |
| else if the current course is less than the root | 1 | n | n |
| traverse the left side | 1 | n | n |
| if the left side is null | 1 | n | n |
| set current course to left side | 1 | n | n |
| else if current course is greater than the left side | 1 | n | n |
| set current course to right side | 1 | n | n |
| for each line in the file | 1 | n | n |
| create course item | 1 | n | n |
| while a prerequisite exists | 1 | n | n |
| add prerequisite | 1 | n | n |
| ***Total Cost*** | | | 11n + 2 |
| ***Runtime*** | | | O(n) |