Runtime Analysis For Reading the File and Creating Course Objects:

| Vector | Line Cost | # Times Executes | Total Cost |
| --- | --- | --- | --- |
| Create vector | 1 | 1 | 1 |
| for each line in file | 1 | n | n |
| Create vector course item | 1 | n | n |
| While prereq exists | 1 | n | n |
| Append prereq | 1 | n | n |
| Pushback course item | 1 | n | n |
| Total Cost | | | 5n + 1 |
| Runtime | | | O(n) |

| HashTable | Line Cost | # Times Executes | Total Cost |
| --- | --- | --- | --- |
| Create hash table | 1 | 1 | 1 |
| Insert method | 0 | 0 | 0 |
| Create key for course | 1 | n | n |
| If no entry found for key | 1 | n | n |
| Assign node to key | 1 | n | n |
| Else | 1 | n | n |
| assign old node key to UNIT\_MAX, set to key, set old node to course and old node next to null pointer | 4 | n | 4n |
| Else | 1 | n | n |
| find the next open node | 1 | n | n |
| add new newNode to end | 1 | n | n |
| For each line in file | 1 | n | n |
| Create vector course item | 1 | n | n |
| While prereq exists | 1 | n | n |
| Append prereq | 1 | n | n |
| Insert course item | 1 | n | n |
| Total Cost | | | 16n + 1 |
| Runtime | | | O(n) |

| Tree | Line Cost | # Times Executes | Total Cost |
| --- | --- | --- | --- |
| Create tree | 1 | 1 | 1 |
| Add node method | 0 | 0 | 0 |
| If root is null, add root | 1 | 1 | 1 |
| If node is less than root then add to left | 1 | n | n |
| If no left node | 1 | n | n |
| this node becomes left | 1 | n | n |
| If node is greater than root add right | 1 | n | n |
| if no right node | 1 | n | n |
| this node becomes right | 1 | n | n |
| For each line in file | 1 | n | n |
| Create vector course item | 1 | n | n |
| While prereq exists | 1 | n | n |
| Append prereq | 1 | n | n |
| Insert course item | 1 | n | n |
| Total Cost | | | 11n + 2 |
| Runtime | | | O(n) |