**Vector Runtime**  **Analysis**

|  |  |  |  |
| --- | --- | --- | --- |
| **Code Line** | **Line Cost** | **# Times Executes** | **Total Cost** |
| for all courses | **1** | **n** | **n** |
| **if courseNumber**  matches | **1** | **n** | **n** |
| for each prerequisite of the course | **1** | **1** | **1** |
| print the prerequisite info | **1** | **p (avg prereqs)** | **p** |
| **Total Cost** |  |  | **2n + p + 1** |
| **Runtime** |  |  | O(n) |

**Hash Table Runtime**  **Analysis**

|  |  |  |  |
| --- | --- | --- | --- |
| **Code Line** | **Line Cost** | **# Times Executes** | **Total Cost** |
| **lookup course by key** | **1** | **1** | **1** |
| **if found, print course info** | **1** | **1** | **1** |
| **for each prerequisite** | **1** | **p** | **p** |
| **lookup prerequisite in hash table** | **1** | **p** | **p** |
| **print prerequisite info** | **1** | **p** | **p** |
| **Total Cost** |  |  | **3p + 2** |
| **Runtime** |  |  | **O(p)** |

**Tree Runtime Analysis**

|  |  |  |  |
| --- | --- | --- | --- |
| **Code Line** | **Line Cost** | **# Times Executes** | **Total Cost** |
| search course  **in BST** | **log n** | **1** | **log n** |
| **if found, print course info** | **1** | **1** | **1** |
| **for each prerequisite** | **1** | **p** | **p** |
| search prerequisite  **in BST** | **log n** | **p** | **p log n** |
| **print prerequisite info** | **1** | **p** | **p** |
| **Total Cost** |  |  | p log n + 2p  **+ log n** |
| **Runtime** |  |  | **O(p log n)** |