**Anthony Collins**

**Project One**

**Runtime Analysis**

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| --- | --- | --- | --- |
| Operation | Vector | Hash Table | Binary Search Tree |
| Load Data | O(n) | O(n) | O(n log n) |
| Search for a Course | O(n) | O(1) | O(n log n) |
| Insert Course | O(1) | O(1) | O(n log n) |
| Print All Courses Alphanumerically | O(n log n) | O(n log n) | O(n log n) |

**Evaluation**

Vector  
 Advantages: Simple to implement, dynamic resizing.  
 Disadvantages: Slow search and insertion times as the number of courses increases.  
  
Hash Table  
 Advantages: Fast search and insertion times.  
 Disadvantages: Requires a good hash function, can suffer from collisions.  
  
Binary Search Tree  
 Advantages: Efficient search, insert, and delete operations.  
 Disadvantages: Performance can degrade to O(n) if the tree becomes unbalanced.