# 2. Runtime and Memory Analysis

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| --- | --- | --- | --- | --- |
| Structure | Loading Time | Memory Usage | Search Time | Sort Time |
| Vector | O(n) | O(n) | O(n) | O(n log n) |
| Hash Table | O(n) | O(n) | O(1) avg / O(n) worst | O(n log n) (after conversion) |
| BST | O(n log n) avg / O(n²) worst | O(n) | O(log n) avg / O(n) worst | O(n) |

Each structure was reviewed for how fast it loads courses, how much memory it uses, how quick it is to search, and how well it prints the courses. Vectors are easy to use but can be slow when searching. Hash tables are fast for finding courses, but they don’t keep courses in order. Trees are good for sorting and searching, but they can get slow if they aren’t balanced.