Evaluation:

When evaluating the three data structures, it is essential to consider the specific requirements of ABCU’s course management system, as well as the trade-offs in performance, functionality, and implementation complexity. Each data structure comes with its own advantages and disadvantages, making it imperative to assess their suitability for this project carefully.

The vector data structure is straightforward to implement and dynamically adjusts to accommodate varying numbers of courses. However, searching for a course necessitates a full scan (O(n)), and sorting all courses for display incurs a time complexity of O(n log n). While it may be adequate for small datasets, its inefficiency in managing searches and sorted outputs renders it less suitable for this project.

The Hash Table excels in search efficiency, offering an O(1) lookup time, which is ideal for quickly retrieving course details or verifying prerequisites. Nevertheless, it lacks inherent ordering, necessitating additional processing to sort courses for display. Despite this limitation, its rapid search capabilities make it highly effective for large datasets, aligning well with the project's requirements.

The Binary Search Tree (BST) strikes a balance in data storage by maintaining sorted order and supporting efficient searches (O(log n)) as well as in-order traversal (O(n)) for sorted outputs. However, its performance depends on maintaining a balanced tree; an unbalanced BST can degrade to O(n) performance. Additionally, the implementation and management of a balanced BST introduce complexity compared to the other data structures.

In conclusion, the Hash Table is the most suitable choice for the project due to its outstanding search efficiency, which is crucial for quick course lookups. While it does require additional steps for sorting, this trade-off is manageable given its benefits. Therefore, I recommend the Hash Table as the primary data structure for ABCU’s course management system, supplemented by methods for sorting when necessary.