Module 6-2: Project One

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CS 300: DSA: Analysis and Design

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**File Reading and Object Creation**

Procedure LoadCourseData(filename):  
   Open file  
   For each line in file:  
       Split line by commas into fields  
       courseNumber ← fields[0]  
       courseName ← fields[1]  
       prerequisites ← fields[2..n]  
       Create Course object with courseNumber, courseName, prerequisites  
       Add Course to selected data structure  
   Close file

**Printing Course Information and Prerequisites**

Procedure PrintCourseDetails(courseNumber):  
   course ← FindCourse(courseNumber)  
   If course exists Then  
       Print(course.courseNumber + ": " + course.courseName)  
       If course.prerequisites is empty Then  
           Print("No prerequisites")  
       Else  
           Print("Prerequisites: ")  
           For each prereq in course.prerequisites:  
               Print(prereq)  
   Else  
       Print("Course not found")

**Printing Courses in Alphanumeric Order**

Procedure PrintCourseListAlphanumeric(dataStructure):

Sort course list or keys by courseNumber

For each course in sorted order:

Print(course.courseNumber + ", " + course.courseName)

**Menu Pseudocode**

Procedure MainMenu():

dataStructure ← Prompt("Select data structure")

Repeat

Display menu options

choice ← Prompt("Choose option")

Case choice of

1: LoadData()

2: PrintAllCourses()

3: PrintSingleCourse()

9: Exit

Default: Print("Invalid option")

Until choice = 9

|  |  |  |  |
| --- | --- | --- | --- |
| Structure | Avg Runtime | Worst Runtime | Notes |
| Vector | O(n) | O(n) | Simple, good for small data |
| Hash Table | O(1) | O(n²) | Best for quick lookups |
| BST | O(log n) | O(n²) | Sorted automatically |

The hash table is the best fit for ABCU’s advising program. Advisors usually need to find one course and its prerequisites fast, and the hash table can do that in O(1) time on average. Vectors are simpler to set up but slow for repeated searches, while binary search trees keep courses sorted automatically but take more work to manage.