### **Pseudocode for Managing Course Data Using a Hash Table**

#### **1. Define Data Structures**

1. **Course**
   * **Attributes**:
     + courseNumber: string
     + title: string
     + prerequisites: list of strings
2. **Node**
   * **Attributes**:
     + course: Course
     + next: Node\*
3. **HashTable**
   * **Attributes**:
     + tableSize: integer
     + nodes: list of Node\* (initially empty)

#### **2. Function to Open, Read, and Parse File**

1. **Function loadCoursesFromFile(filePath, hashTable)**
   * Open the file located at filePath for reading
   * **If file cannot be opened**:
     + Print "Error: Cannot open file."
     + Exit function
   * Initialize an empty HashTable object (if not passed as parameter)
   * **For each line in the file**:
     + Read the line
     + Split the line into tokens using a delimiter (e.g., comma)
     + **If the number of tokens is less than 2**:
       - Print "Error: Invalid format on line" and the line
       - Continue to the next line
     + Extract courseNumber, title, and prerequisites from tokens
     + **For each prerequisite in the list of prerequisites**:
       - **If the prerequisite is not in the hashTable**:
         * Print "Error: Prerequisite course not found on line" and the line
         * Continue to the next line
     + Create a Course object with courseNumber, title, and prerequisites
     + Insert the Course object into hashTable
   * Close the file

#### **3. Function to Insert Course Object into Hash Table**

1. **Function insertCourse(hashTable, course)**
   * Compute key from course.courseNumber using a hash function
   * Create a new Node with the Course object
   * **If hashTable.nodes[key] is empty**:
     + Set hashTable.nodes[key] to the new Node
   * **Else**:
     + Traverse the linked list at hashTable.nodes[key]
     + Add new Node to the end of the list

#### **4. Function to Print Course Information**

1. **Function printCourseInfo(hashTable, searchCourseNumber)**
   * Compute key from searchCourseNumber using a hash function
   * **If hashTable.nodes[key] is empty**:
     + Print "Course not found."
     + Exit function
   * Traverse the linked list at hashTable.nodes[key]:
     + **If a Node with matching courseNumber is found**:
       - Print "Course Number: " and Node.course.courseNumber
       - Print "Title: " and Node.course.title
       - Print "Prerequisites: " and the list of Node.course.prerequisites
       - Exit function
   * **If no matching course is found**:
     + Print "Course not found."

#### **5. Hash Function**

1. **Function hash(courseNumber)**
   * Compute the hash value of courseNumber to get an index for hashTable.nodes
   * Return the index (hash value)

### **Example Workflow**

1. **Load Courses from File**:
   * Call loadCoursesFromFile("courses.txt", hashTable)
   * This function reads each line, validates the format, creates Course objects, and stores them in hashTable.
2. **Print Course Information**:
   * Call printCourseInfo(hashTable, "CS101")
   * This function searches for the course with number "CS101" and prints its details and prerequisites.

### **Error Checking**

1. **File Opening**: Ensure the file is accessible.
2. **Line Format**: Verify each line has at least two parameters.
3. **Prerequisite Validation**: Check if all prerequisites exist in the hash table before storing.