class HashTable:

field size

field table

constructor(size):

this.size = size

this.table = new array of size

function \_hash(key):

return hash(key) % this.size

function put(key, value):

index = \_hash(key)

if table[index] is empty:

table[index] = new list

append (key, value) to table[index]

function get(key):

index = \_hash(key)

if table[index] is not empty:

for each (storedKey, storedValue) in table[index]:

if storedKey == key:

return storedValue

return null

function contains(key):

return get(key) is not null

class Course:

field courseNumber

field title

field prerequisites

constructor(courseNumber, title):

this.courseNumber = courseNumber

this.title = title

this.prerequisites = empty list

function parseFile(filename):

open file "filename" for reading

courses = new HashTable(100) // Create a new hash table for courses

for each line in file:

if line is empty:

continue

tokens = split line by commas

// Validate if at least course number and title are present

if size of tokens < 2:

print "Error: Missing course number or title"

continue

courseNumber = tokens[0]

title = tokens[1]

// Create a new Course object

course = new Course(courseNumber, title)

// If there are prerequisites, add them

for i from 2 to size of tokens - 1:

course.prerequisites.append(tokens[i])

// Store the course in the hash table

courses.put(courseNumber, course)

close file

return courses

function validatePrerequisites(courses):

for each course in courses:

courseObj = courses.get(course)

// Check if all prerequisites are valid

for each prerequisite in courseObj.prerequisites:

if not courses.contains(prerequisite):

print "Error: Prerequisite " + prerequisite + " for course " + courseObj.courseNumber + " does not exist"

function printCourseInformation(courses):

for each course in courses:

courseObj = courses.get(course)

print "Course: " + courseObj.courseNumber + " - " + courseObj.title

if courseObj.prerequisites is empty:

print " No prerequisites"

else:

print " Prerequisites:"

for each prerequisite in courseObj.prerequisites:

prerequisiteCourse = courses.get(prerequisite)

print " " + prerequisiteCourse.courseNumber + " - " + prerequisiteCourse.title

function searchCourse(courses, courseNumber):

if courses.contains(courseNumber):

courseObj = courses.get(courseNumber)

print "Course: " + courseObj.courseNumber + " - " + courseObj.title

if courseObj.prerequisites is empty:

print " No prerequisites"

else:

print " Prerequisites:"

for each prerequisite in courseObj.prerequisites:

prerequisiteCourse = courses.get(prerequisite)

print " " + prerequisiteCourse.courseNumber + " - " + prerequisiteCourse.title

else:

print "Error: Course " + courseNumber + " not found"

function main():

filename = "courses.txt" // example filename

courses = parseFile(filename) // Parse the course data file and create course objects

// Validate prerequisites after all courses are loaded

validatePrerequisites(courses)

// Print out the course information

printCourseInformation(courses)

// Example search for a specific course

searchCourse(courses, "CSCI200")