CIS 41A - Lab Assignment 5: regular expression, variable argument lists, function as first class objects, generator

Overview

Improve the efficiency of lab 4 and have it read data from an input file.

Program description

The program is still implemented with 2 files:

* course.py: contains a superclass called Course and 2 subclasses called CreditCourse and NonCreditCourse
* lab5.py: user interface and driver for the Course classes

Modification for course.py

1. Course class:

* When reading in a class time, such as 9:30am, allow a more flexible format and require the use of am/pm:
  + The hour field can be 1 or 2 digits only, and not more than 2. Valid examples: 9:30am or 12:30pm
  + The minute field can be 0 or 2 digits only, not 1 digit or more than 2. Valid examples: 1pm or 8:15pm
  + The colon between the hour and minute fields can be optional. Valid examples: 1030am or 8am
  + The 'am' or 'pm' can be uppercase or lowercase or a mixture of both. Valid examples: 11AM or 12Pm
  + There can be 1 or more spaces before the time, after the time, and in between the time and 'am' or 'pm'.  
    Valid examples: <tab><space>2:50<space>pm or 9<space>am or 3:15pm<space><tab>
  + Your code should use only 1 if statement with 1 test condition to determine if the class time is valid.   
    But better yet, *for 1 pt extra credit: use exception handling instead of if else.*
  + If the time is invalid, prompt for a new time and keep re-prompting until there is a valid time.

2. CreditCourse class:

* The grades in lab 4 is a sequence of graded tasks and corresponding scores. Add one more field: letter grade.   
  This means the grades for one class is a sequence of graded tasks and corresponding scores and letter grades.  
  For example: "Essays" has a score of 89 and a letter grade of B+

Use an appropriate data structure to store all the graded tasks and the associated scores and letter grades. Don't store it as 3 separate lists.

* When printing the grades, print each graded task in 3 columns. For example:  
   Essays: 89 B+  
   Quizzes: 92 A
* [2pts extra credit: After printing the above tasks and grades, also print the average letter grade.  
  The average grade is calculated by finding the average of all the scores and use the average to determine the letter grade. Use the following look up table to determine the letter grade:  
   lowest score limit: 98, 92, 90, 88, 82, 80, 78, 72, 70, 68, 62, 60, 0  
  corresponding letter grade: A+, A, A-, B+, B, B-, C+, C , C-, D+, D, D-, F  
  To earn the 2 pts extra credit you should not have to use multiple if statements.]

3. Appropriately change a method to have a variable argument lists.

Remember that it's appropriate if you don't have to change a bunch of variable names inside the method after you change to a variable argument list.

4. The main function for unit testing should still produce the same result as in lab 4.

Modification for lab5.py

1. If you haven't used OOP in lab 4, change it to OOP by creating a class called ClassList.

Your main function should be:

def main() :

L = ClassList()

L.report()

2. Input data:

* Instead of prompting the user for data, the ClassList object reads data from an input file called lab5.txt
* If the file can't be opened, print an error message and terminate the program.
* Each credit course in the file is made of 6 consecutive lines in the input file:
  1. A line containing the letter 'c' to indicate credit class
  2. A line containing the name, class time, days, units
  3. A line containing the supplies
  4. A line containing the graded tasks
  5. A line containing the corresponding scores
  6. A line containing the corresponding letter grades
* Each non-credit course in the file is made of 4 consecutive lines in the input file:
  1. A line containing the letters 'nc' to indicate non-credit class
  2. A line containing the name, class time, days
  3. A line containing the supplies
  4. A line containing the activities
* The lines in the input file can have extra whitespaces in front, at the end, and in between data values.
* For every extra line of text that isn't part of the 6 lines of a credit course or the 4 lines of a non-credit course, print an error message and print the line of error.
* Ignore blank lines in the file

3. Program output:

* Every sequence should be printed in alphabetical order:
  + Class names are in alphabetical order when printing the class list
  + Supplies are in alphabetical order when printing the daily supplies, but the days are in M T W R F order
  + Graded tasks and activities are in alphabetical order when printing activities
* Data should be printed with no extra space in front or in the back, but comma separated sequences should be printed with space after the comma
* See sample output

4. Modify the report method so that it will:

* Print a menu of 4 choices, to print: c. Class list, s. Supplies, a. Activities, q. Quit
* Loop and ask the user for a choice, then process the choice by calling the appropriate method, until the user chooses to quit.

Your code should not use an if elif statement to process the user choice.

Sample Output (user input highlighted in blue)

Invalid line: an error line # find error line in the file

2:3Pm is not valid. Enter new time: 2:00fm # keep re-prompting when invalid time

2:00fm is not valid. Enter new time: 2:03 pm # until time is valid

Invalid line: ##### # find error line in the file

c. Class List # start of report method output

s. Supplies

a. Activities

q. Quit

Choice: c

Class List:

CHEM 1A, 11:00AM, MWF, 5.0 units

CIS 28, 6:30PM, TR, 4.5 units

CIS 41A, 9:30AM, MW, 4.5 units

DANCE, 2:30PM, F

HIST 17, 3:00PM, TR, 4.0 units

Choice: A

Activities for each class

CHEM 1A, 11:00AM, MWF, 5.0 units

Exams: 83.0 B

Homework: 80.0 B-

Quizzes: 72.5 C

Current avg: 78.5 C+ # extra credit

CIS 28, 6:30PM, TR, 4.5 units

Exams: 92.0 A

Labs: 90.5 A-

Current avg: 91.2 A- # extra credit

CIS 41A, 9:30AM, MW, 4.5 units

Exams: 87.5 B

Labs: 92.5 A

Quizzes: 99.0 A+

Current avg: 93.0 A # extra credit

DANCE, 2:30PM, F

Jazz, Modern

HIST 17, 3:00PM, TR, 4.0 units

Term papers: 82.5 B

Tests: 78.0 C+

Current avg: 80.2 B- # extra credit

Choice: k

Invalid choice

Choice: S

Supplies for each day of class:

M: lab manual, laptop

T: laptop, textbook

W: lab manual, laptop

R: laptop, textbook

F: dance shoes, lab manual, laptop

Choice: q