Final Project: Course and Student Class and Objects

IM1201301 – Computer Programming

Instructor: Chao-Lung Yang

Final Project

- 台科大教務處想請同學協助,利用Python程式完成下列任務
  - 讀取學生資料檔、課程資料檔及成績資料檔
  - 列印出每個課程的修課人員
  - 列印出每個同學所修的課及GPA
  - GPA 計算公式為
    - ∑（每修習科目的成績 *科目學分數）/ 總共學分數

Final Project (1)

- Download three csv files from Moodle
  - students.csv
  - courses.csv
  - coursegrade.csv
- Download a template python code from Moodle
  - Template.py

Final Project (2)

- Create 4 Classes
  - NTUSTPerson
  - Student
  - UG
  - Course
- Complete the function definition in each Class

Final Project (3)

- Read three csv files and store information into the following structures by the defined classes
  - UGid = [] # A list of student's id
  - UGstudents = {} # A dictionary whose key is student's ID, and value is Student Object
  - Courseid = [] # A list of course's id
  - Courses = {} # A dictionary whose key is course's ID, and value is Course Object

Final Project (4)

- Write a program to list all courses and the associated students who took the course
  - 寫一個程式將每個課程及該課程修課的同學列印出來
- Write a program to list all students and the courses the student took and the grade the student obtain. Also compute the GPA for each student
  - 寫一個程式列印出每位同學的資訊，並將該同學所修習的課程及成績列印出來。
  - 並且計算出每個同學的GPA

Final Project (4)

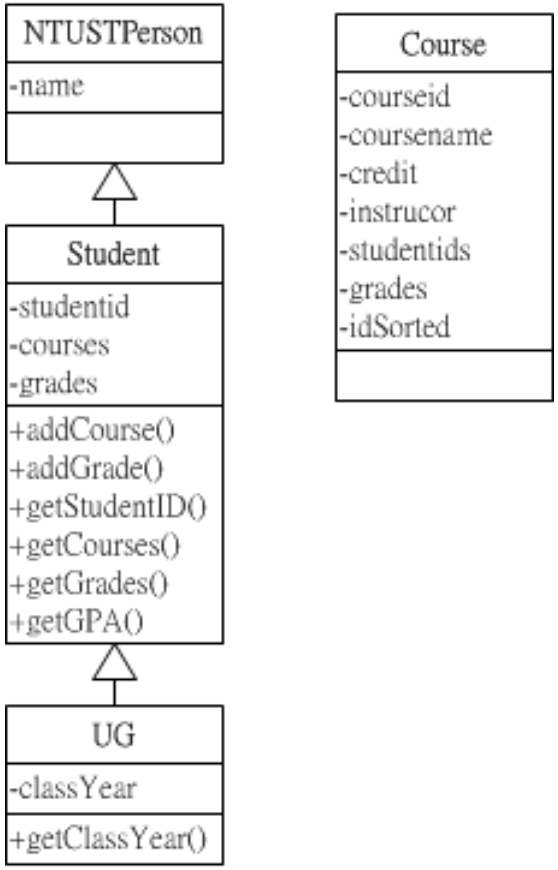
- 此Project為小組作業
- 若有人協助請說明，若為外系人員，請留下該人員之姓名，電話（手機為佳），我會請助教聯繫
- Due date: 6/19 10:20
- Final Exam (6/19 10:20) 將針對此一project進行上機考試

Final Project提示

- templete.ipynb可分為三大部份
  - (1) Class定義
  - (2) 讀取csv檔案,共完成物件的建立,並儲存於指定的資料結構
    - UGid = []
      - # A list of student's id
    - UGstudents = {}
      - # A dictionary whose key is student's ID, and value is Student Object
    - Courseid = []
      - # A list of course's id
    - Courses = {}
      - # A dictionary whose key is course's ID, and value is Course Object
  - (3) 利用指定的資料結構完成資料列印

(1) Class 定義

- 類別繼承關係如右
- Student類別中定義了該學生修課的清單及成績
  - courses: dictionary
  - grades: dictionary
- Course類別中定義了該課程修課的學生清單及其成績
  - studentids: list
  - Grades: dictionary
- 每位學生均需利用UG產生一個物件
- 每一個課程均需利用Course產生一個物件



(2) 讀取csv檔案

- 讀取csv檔案時,請依序從students.csv,courses.csv及coursegrade.csv開始
- 每個students.csv的學生均需要利用UG類別產生一個物件
  - 將學生的學號加到UGid中
  - 將UGstudents以學號當作key, UG類別所產生的物件當作value
    - UGstudents[學號] = UG(學號,姓名,入學年)
- 每個courses.csv的課程均需要利用Course類別產生一個物件
  - 將課程的編號加到Courseid中
  - 將Courses以課程編號當作key, Course類別所產生的物件當作value
    - Courses[課程編號] = Course(課程編號,課程名稱,學分數,授課老師)
    - 注意: 學分數要為整數

(2) 讀取csv檔案

- 每筆coursegrade.csv的成績紀錄都要將Courses及UGstudents中的物件進行課程及成績的登錄
  - Courses[課程編號].addStudent(UGstudents[學號])
  - Courses[課程編號].addGrade(UGstudents[學號],成績)
  - UGstudents[學號].addCourse(Courses[課程編號])
  - UGstudents[學號].addGrade(課程編號,成績)

(3)資料列印

- 利用for 迴圈,將Courses及UGstudents中的物件資料列印出來,如下

```
Course: IM3003301 統計學(一)
B10101063 [91]
B10230228 [19]
B10233007 [87]
B10233011 [97]
Course: IM3005301 管理數學
B10101063 [85]
B10230228 [93]
B10233007 [92]
B10233011 [26]
```

```
B10101063 蘇舜綸 2012
['IM3005301', 'IM3003301', 'IM3009701']
[85, 91, 27]
GPA =  67.6666666667
B10130010 趙子傑 2012
['IM3209701', 'IM3210701', 'IM3010701']
[20, 38, 99]
GPA =  52.3333333333
B10130022 彭正偉 2012
['IM3301301', 'IM4103302', 'IM3509301']
[62, 75, 21]
GPA =  56.625
```

- 你們也可以改進列印的方式

建議

- 將template.ipynb中程式,一小段一小段的逐步完成
- 先試著完成類別的定義,並試著以UG類別及Course類別建立物件

Useful operations on dict

- Figure 5.10 contains some of the more useful operations on dictionaries

len(d) returns the number of items in d.
d.keys() returns a list containing the keys in d.
d.values() returns a list containing the values in d.
k in d returns True if key k is in d.
d[k] returns the item in d with key k.
d.get(k, v) returns d[k] if k is in d, and v otherwise.
d[k] = v associates the value v with the key k in d. If there is already a value associated with k, that value is replaced.
del d[k] removes the key k from d.
for k in d iterates over the keys in d.