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Assignment 1

Group Size

This is an individual assessment.

Due Date

See course webpage

Submission Checklist

- ☐ You should submit the following files:
 - ☐ `main.swift` file
 - ☐ `Student.swift`
 - ☐ `Course.swift`
 - ☐ `Transcript.swift`
 - ☐ `UndergraduateTranscript.swift`
 - ☐ `PostgraduateTranscript.swift`
- ☐ Compress your files into a single zip file. **Other compressed file formats (7zip, rar) will not be graded.**
 - ☐ Learners using XCode can simply zip the entire XCode project (.xcodproj file + folder containing your swift files)
- ☐ Name your zip file: **a1-studentname-studentid.zip**. Replace studentname,studentid with your name and id.
- ☐ Submit your zip file to the assignment dropbox by the specified due date.

Academic Integrity

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<https://www.senecacollege.ca/about/policies/academic-integrity-policy.html>

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Business Requirements

You have been hired as a programmer by the college to write a program that generates student transcripts.

1. Students

There are two types of Students in the college: **Undergraduate** and **Postgraduate** students.

Undergraduate students are graded using the GPA scale.

Postgraduate students are graded based on Pass/Fail criteria.

2. Courses

The student transcript records a list of all the courses a student takes. Each course has a course title and the grade the student received in a course.

Undergraduate students are assigned a grade from 0-100 for the course.

Postgraduate students are assigned either a Pass or Fail for the course.

A student can only take a course once. Attempting to take the course more than once is not permitted.

3. Transcripts

Every student has a transcript. All transcripts display the following information:

1. The student's personal information (name, id, undergraduate/postgraduate)
2. The list of courses the student took
3. The grade they received in each course. There are two possible ways to display the grade:
 - For undergraduate students, the grade is shown as a percentage out of 100 (eg: 85)
 - For graduate students, the grade is shown as Pass/Fail

In addition, an undergraduate student transcript must display the student's overall GPA out of 4. Postgraduate student transcripts do not contain a GPA.

Example of an undergraduate student transcript:

```
Student Name:  Laura Diaz
Student ID:    771522
Student Type:  Undergraduate

Algebra                94
English in Pop Culture  49
Intro to Biology       75

GPA: 2.0
```

Example of a postgraduate student transcript:

```
Student Name: Nelle
```

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Student ID: 779988	
Student Type: Postgraduate	
Statistics	FAIL
Creative Problem Solving	PASS

4. Grading Criteria

Undergraduate Students:

The GPA of an undergraduate student is based on their average grade across all courses. The grade is then converted to a GPA score out of 4, per the chart below:

Average (%)	GPA
90-100	4
80-89.9	3.0
70-79.9	2.0
60-69.9	1.2
0-59.9	0

Graduate Students

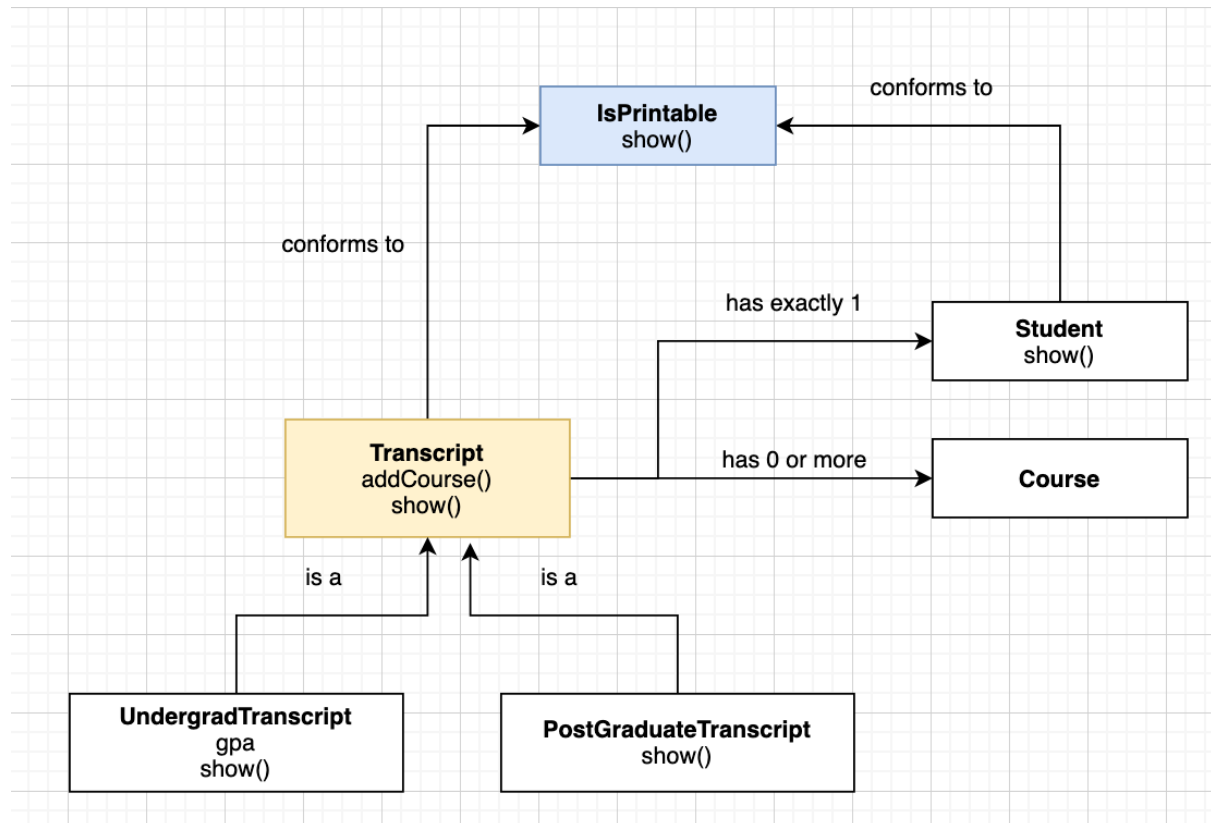
Graduate students are graded on a PASS/FAIL criteria.

A graduate student passes or fails a course based on the following criteria:

Grade (%)	Pass/Fail
50-100	Pass
< 50 (less than 50)	Fail

Implementation Details

Your program must be developed from an object oriented perspective and conform to the following design.



IsPrintable

1. A protocol containing a single function, called **show()**
2. The **Student** and **Transcript** data types conform to this protocol.

Student

1. The **Student class** has the following properties:
 - `id` (string)
 - `first name` (string)
 - `last name` (string optional)
 - `full Name` (computed property, String)
 - `type` (String enumeration)
2. The full name of a student depends on whether they have a last name.
 - If the learner has a last name, then their full name consists of their first name and last name, separated by a space (eg: Peter Smith)
 - If the learner does not have a last name, then their full name consists of only their first name (eg: Peter)

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3. Conforms to the `IsPrintable` protocol. The **`show()`** function should output the student's full name, id, and type, like this:

```
Student Name:  Laura Diaz
Student ID:    771522
Student Type:  Undergraduate Studies
```

Course

1. Courses must be modelled as a **class** with **no explicit initializer**.

2. All courses have the following properties:

- **Course Title**, eg: Intro to Biology (string)
- **Grade received in the course**, out of 100 (double)

Transcript

1. The Transcript **class** is the superclass of **`UndergraduateTranscript`** and **`PostGraduateTranscript`** data types.

2. Contains a student and list of courses.

3. The class contains the following functions:

`addCourse()`: This function adds a course to the student's transcript. The function must output a confirmation message indicating that the course has been added.

`show()`: Inherited from the **`IsPrintable`** protocol. Outputs the student's information, the list of courses, and the grade in each course (out of 100) to the screen. Student information should be output using the **Student's `show()`** function. Example:

```
Student Name:  Laura Diaz
Student ID:    771522
Student Type:  Undergraduate

Algebra                94
English in Pop Culture 49
Intro to Biology       75
```

UndergraduateTranscript:

1. Must be modelled as a **class** that inherits from the Transcript data type.

2. Contains a single computed property called **`gpa`**. This property calculates the GPA of the student associated with the transcript.

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3. Must override the parent class' **show()** function by outputting the transcript and the calculated GPA.
Example:

```
Student Name: Laura Diaz
Student ID: 771522
Student Type: Undergraduate

Algebra          94
English in Pop Culture  49
Intro to Biology  75

GPA: 2.0
```

PostgraduateTranscript:

1. Must be modelled as a **class** that inherits from the Transcript data type.
2. Must override the parent class' **show()** function by outputting the transcript for a postgraduate student.

```
Student Name: Nelle
Student ID: 779988
Student Type: Postgraduate

Statistics          FAIL
Creative Problem Solving  PASS
```

Main.swift File

To demonstrate the correctness of your design, provide a main.swift file that performs the following actions:

1. Create an Undergraduate student with a first name and last name
2. Create a Postgraduate student with a first name, but no last name
3. Create 5 courses and assign grades to each course.
4. Create a transcript for the undergraduate student. Add 3 of the courses to the transcript.
5. Create a transcript for the postgraduate student. Add 2 of the courses to the transcript.
6. Print out the transcript for both the Post and Undergraduate Student by calling each transcript's respective show() function