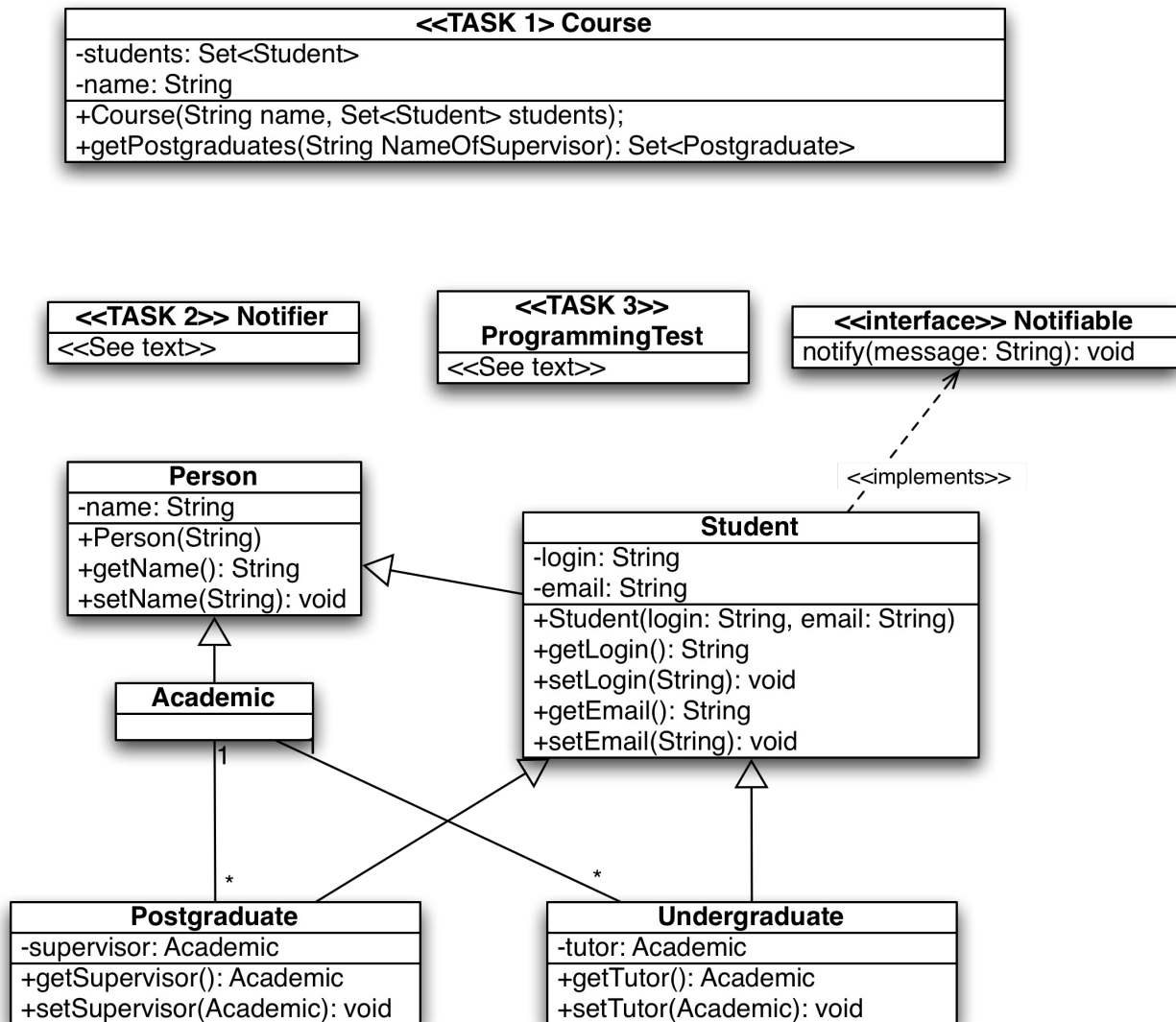


## Section A



### Problem Description

The setting for this section is a University management system in which there are **Students** who can be of two kinds, **Postgraduate** and **Undergraduate**, and **Academic** staff members who can be supervisors of postgraduate students or tutors of undergraduate students. The **Student** class implements the **Notifiable** interface and provides a **notify** method. This method is used to notify students of important events by email.

Given the class diagram provided above and the java source code for all classes and interfaces (except **Postgraduate**, **Course**, **Notifier** and **ProgrammingTest**) therein depicted you are required to fulfil four tasks.

- 1) Write the Java class **Postgraduate.java**. A **Postgraduate** is a **Student** that has

an Academic associated to it as its supervisor.

- 2) Write the Java source code file **Course.java**. A course has a name and a set of students associated to it. The class must provide a method `getPostgraduates` which takes as its only parameter the name of an Academic staff member. The method returns the set of postgraduate students who help with the course. These are postgraduate students who have as their supervisor the Academic staff member given as the parameter. You must also write the constructor for the class as depicted in the class diagram.
- 3) Write the Java source code file **Notifier.java**. Class Notifier should be constructed with a set of notifiable objects which is stored in the attribute **notifiables**. The class provides a **doNotifyAll** method which calls `notify` on all objects in the **notifiables** set. Hint, you need to use the following expression to resolve typing issues with generics: **<? extends Notifiable>** (see incomplete class **Notifier.java** provided)
- 4) Write the Java source code file **ProgrammingTest.java** with a **main** method that
  - a. Creates a course with 2 undergraduate students and 3 postgraduate students based on the information in the table below. Make up any information that is missing in the table (e.g. email).
  - b. Extracts from the course all postgraduate students with “Ismael Bento” as their supervisor using method **getPostgraduates**
  - c. Uses **Notifier** to notify them of the following message: “You have been notified!”

Login	Type	Supervisor/Tutor
gg4	Undergraduate	Ricardo Rodriguez
pr3	Undergraduate	Ismael Bento
te2	Postgraduate	Ricardo Rodriguez
yj34	Postgraduate	Ismael Bento
jj8	Postgraduate	Ismael Bento

Students for main method of ProgrammingTest.java