

# **ASU Course Registration System**

## **System Requirements Capture**

### **Domain Model**

#### **Classes and Associations**

# ASU COURSE REGISTRATION REQUIREMENTS

At the beginning of each term, students may request a course catalogue containing a list of course offerings needed for the term. Information about each course, such as instructor, department, and prerequisites are included to help students make informed decisions.

The new system will allow students to select four course offerings for the coming term. In addition, each student will indicate two alternative choices in case a course offering becomes filled or is canceled. No course offering will have more than forty students or fewer than ten students. A course offering with fewer than ten students will be canceled. Once the registration process is completed for a student, the registration system sends information to the billing system so the student can be billed for the term.

Instructors must be able to access the online system to indicate which courses they will be teaching, and to see which students signed up for their course offerings.

For each term, there is a period of time that students can change their schedule. Students must be able to access the system during this time to add or drop courses.

# ASU DOMAIN MODEL: CLASSES

At the beginning of each term, students may request a course catalogue containing a list of course offerings needed for the term.

<b>classes:</b> <del>Term</del>	→ <b>attribute</b> (of CourseOffering)
Student	→ <b>O.K.</b>
<del>CourseCatalogue</del>	→ <b>irrelevant</b> (physical system output)
CourseOffering	→ <b>O.K.</b>

Information about each course, such as instructor, department, and prerequisites are included to help students make informed decisions.

<b>classes:</b> Course	→ <b>O.K.</b>
Instructor	→ <b>O.K.</b>
Department	→ <b>O.K.</b>
<del>Prerequisite</del>	→ <b>role</b> (of Course)
<del>InformedDecision</del>	→ <b>vague</b> (mental process of students)

# ASU DOMAIN MODEL: CLASSES

The new system will allow students to select four course offerings for the coming term.

**classes:** ~~System~~ → **implementation construct**

In addition, each student will indicate two alternative choices in case a course offering becomes filled or is canceled.

**classes:** ~~AlternativeChoice~~ → **redundant** (same as CourseOffering)

No course offering will have more than forty students or fewer than ten students.

**classes:** *no new classes*

A course offering with fewer than ten students will be canceled.

**classes:** *no new classes*

# ASU DOMAIN MODEL: CLASSES

Once the ~~registration process~~ is completed for a ~~student~~, the ~~registration system~~ sends ~~information~~ to the ~~billing system~~ so the ~~student~~ can be billed for the ~~term~~.

**classes:** ~~RegistrationProcess~~ → **operation** (activity of using the system)  
~~Information~~ → **vague** (need to specify more clearly)  
~~BillingSystem~~ → **irrelevant** (external system)

~~Instructors~~ must be able to access the ~~online system~~ to indicate which ~~courses~~ they will be teaching, and to see which ~~students~~ signed up for their ~~course offerings~~.

**classes:** *no new classes*

For each ~~term~~, there is a ~~period of time~~ that ~~students~~ can change their ~~schedule~~.

**classes:** ~~PeriodOfTime~~ → **vague** (related to processing constraints)  
~~Schedule~~ → **redundant** (same as CourseOffering)

# ASU DOMAIN MODEL: CLASSES

Students must be able to access the system during this time to add or drop courses.

**classes:** *no new classes*

# ASU DOMAIN MODEL: INITIAL CLASS DIAGRAM

## Classes

Student

CourseOffering

Course

Instructor

Department

*Student*

*Instructor*

*Department*

*Course  
Offering*

*Course*

# ASU DOMAIN MODEL: ASSOCIATIONS

At the beginning of each term, **students** ~~may request~~ a course catalogue ~~containing~~ a list of **course offerings** ~~needed~~ for the term.

**associations:** None (possible classes eliminated)

Information about each **course**, such as **instructor**, **department**, and ~~prerequisites~~ ~~are included~~ to help **students** make informed decisions.

**associations:** Course *IsPrerequisiteFor* Course  
Department *Offers* Course → *inferred*  
Instructor *Teaches* CourseOffering → *inferred*

The new system will allow **students** to ~~select~~ four **course offerings** for the coming term.

**associations:** ~~Student Selects CourseOffering~~ → operation



# ASU DOMAIN MODEL: ASSOCIATIONS

In addition, each **student** will indicate two **course offering** alternative choices in case a **course offering** becomes filled or is canceled.

associations: ~~Student Indicates CourseOffering~~ → operation  
~~Student Fills CourseOffering~~ → operation  
~~? Cancels CourseOffering~~ → operation

No **course offering** will have more than forty **students** or fewer than ten **students**.

associations: ~~CourseOffering Has Student~~ → O.K. Student *EnrollsIn* CourseOffering

A **course offering** with fewer than ten **students** will be canceled.

associations: *no new associations*

# ASU DOMAIN MODEL: ASSOCIATIONS

Once the registration process is completed for a **student**, the registration system sends information to the billing system so the **student** can be billed for the term.

**associations:** None (possible classes eliminated)

**Instructor** must be able to access the online system to indicate which **course offering** ~~courses~~ they will be teaching, and to see which **student** signed up for their **course offerings**.

**associations:** ~~Instructor Indicates CourseOffering~~ → operation  
Instructor *Teaches* CourseOffering → **O.K.** (already captured)  
~~Instructor Sees Student~~ → irrelevant  
~~Student SignsUpFor CourseOffering~~ → operation

# ASU DOMAIN MODEL: ASSOCIATIONS

For each term, there ~~is~~ a period of time that **students** can change their ~~schedule~~ **course offering**.

**associations:** ~~Student Changes CourseOffering~~ → operation

**Students** must be able to access the system during this time to add or drop ~~courses~~. **course offering**

**associations:** ~~Student Adds CourseOffering~~ → operation

~~Student Drops CourseOffering~~ → operation

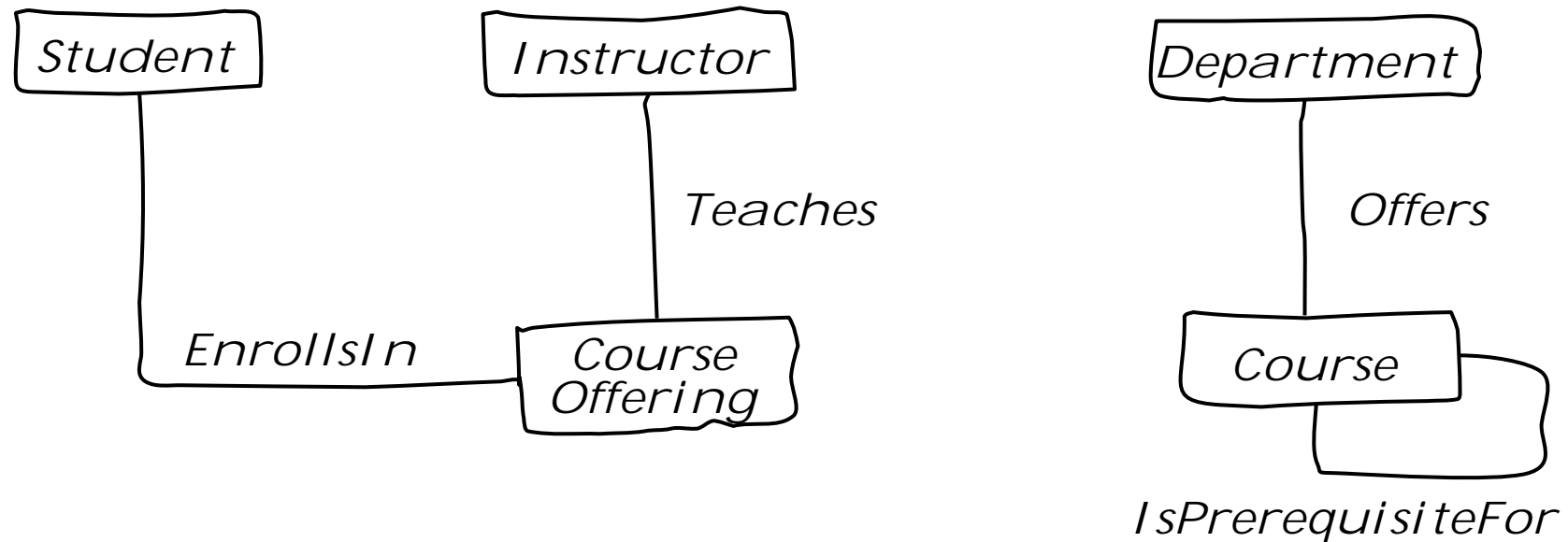
# ASU DOMAIN MODEL: INITIAL CLASS DIAGRAM

## Classes

Student  
CourseOffering  
Course  
Instructor  
Department

## Associations

Instructor *Teaches* CourseOffering  
Department *Offers* Course  
Course *IsPrerequisiteFor* Course  
Student *EnrollsIn* CourseOffering



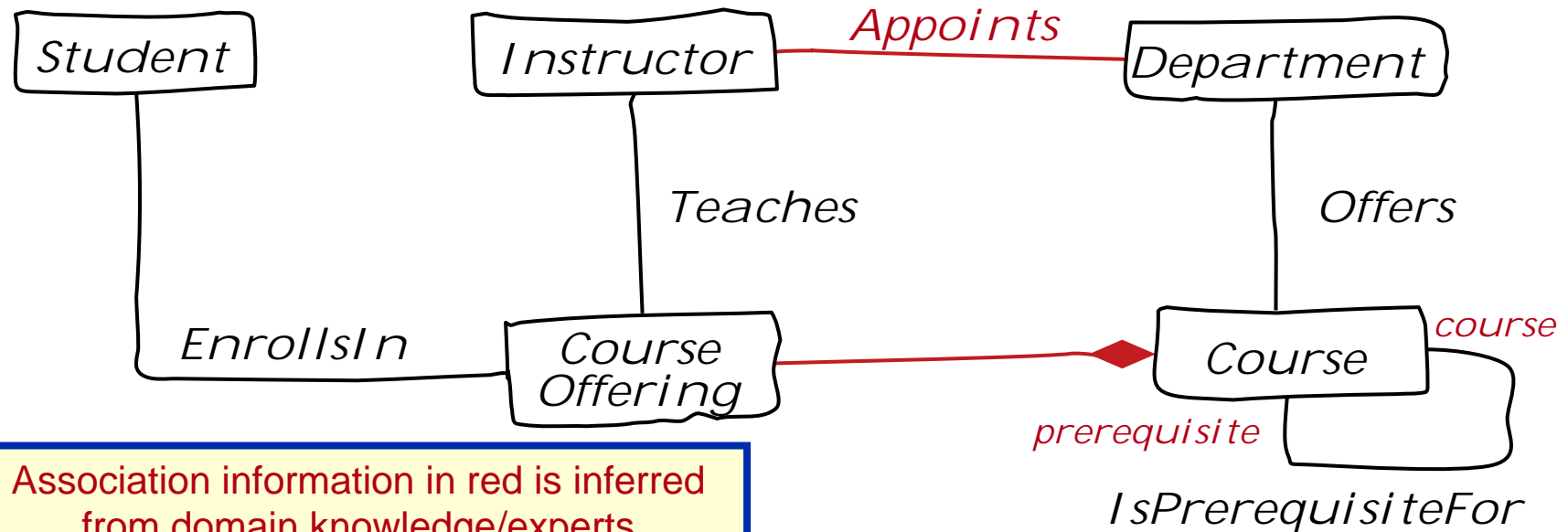
# ASU DOMAIN MODEL: FIRST REFINEMENT

## Classes

Student  
CourseOffering  
Course  
Instructor  
Department

## Associations

Instructor *Teaches* CourseOffering  
Department *Offers* Course  
Course *IsPrerequisiteFor* Course  
Student *EnrollsIn* CourseOffering



Association information in red is inferred from domain knowledge/experts.

# ASU DOMAIN MODEL: ATTRIBUTES

Student
userId :String password : String userGroup : Integer surname : String otherNames : String address : String DOB : Date dateOfAdmission : Date levelOfStudy : String modeOfStudy : String yearOfStudy : Integer

Instructor
userId : String password : String userGroup : Integer surname : String otherNames : String address : String DOB : Date qualification : String dateOfAppointment : String

Department
code: String title : String

Course
code : String title : String description: String credits : Integer

EnrollsIn
grade: Decimal

CourseOffering
offeringId : String term : String year : Integer

**Most of these attributes  
are obtained from the  
domain experts.**

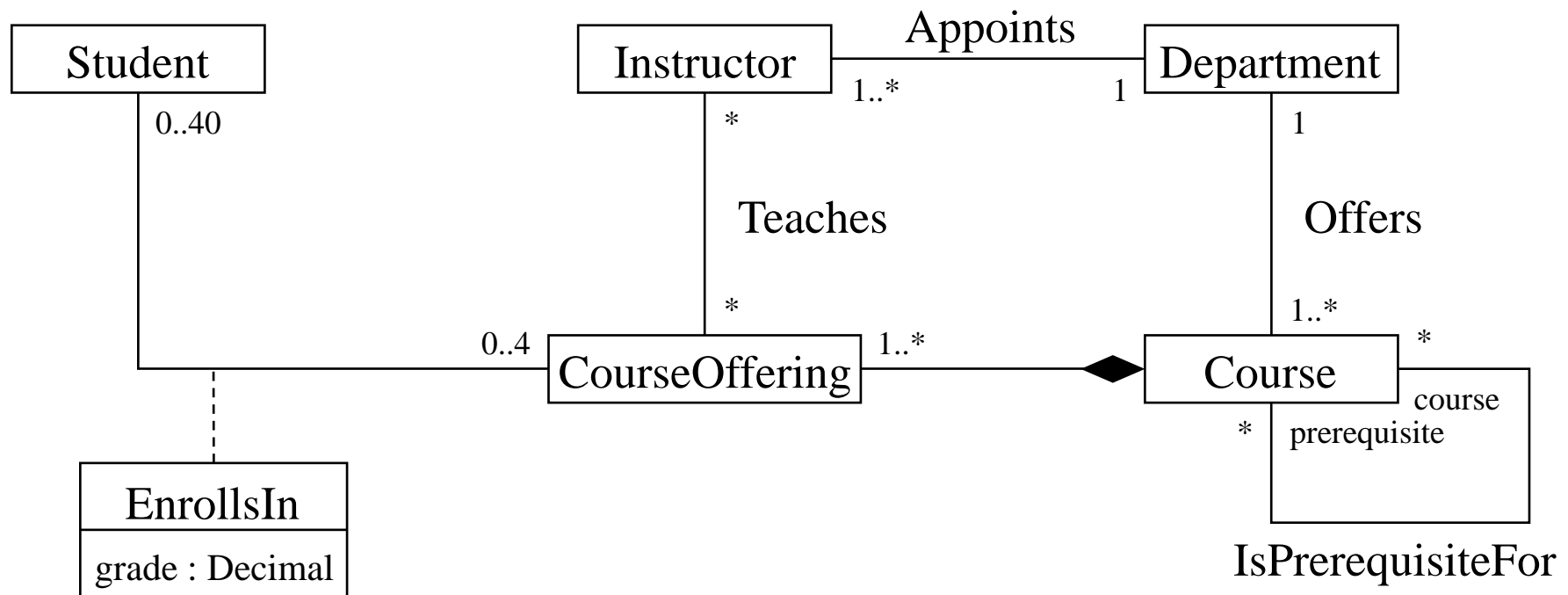
# **ASU Course Registration System**

## **System Requirements Capture**

### **Domain Model Detail**

### **Association Multiplicity**

# ASU DOMAIN MODEL DETAIL: ASSOCIATION MULTIPLICITY



Adding known association multiplicities.



## ASU DOMAIN MODEL DETAIL: ASSOCIATION MULTIPLICITY

- Is the multiplicity of the CourseOffering end of the EnrollsIn association realistic?

✎ A student can enroll in at most four course offerings *during their entire time at the university.*

- Actually, the constraint should be:

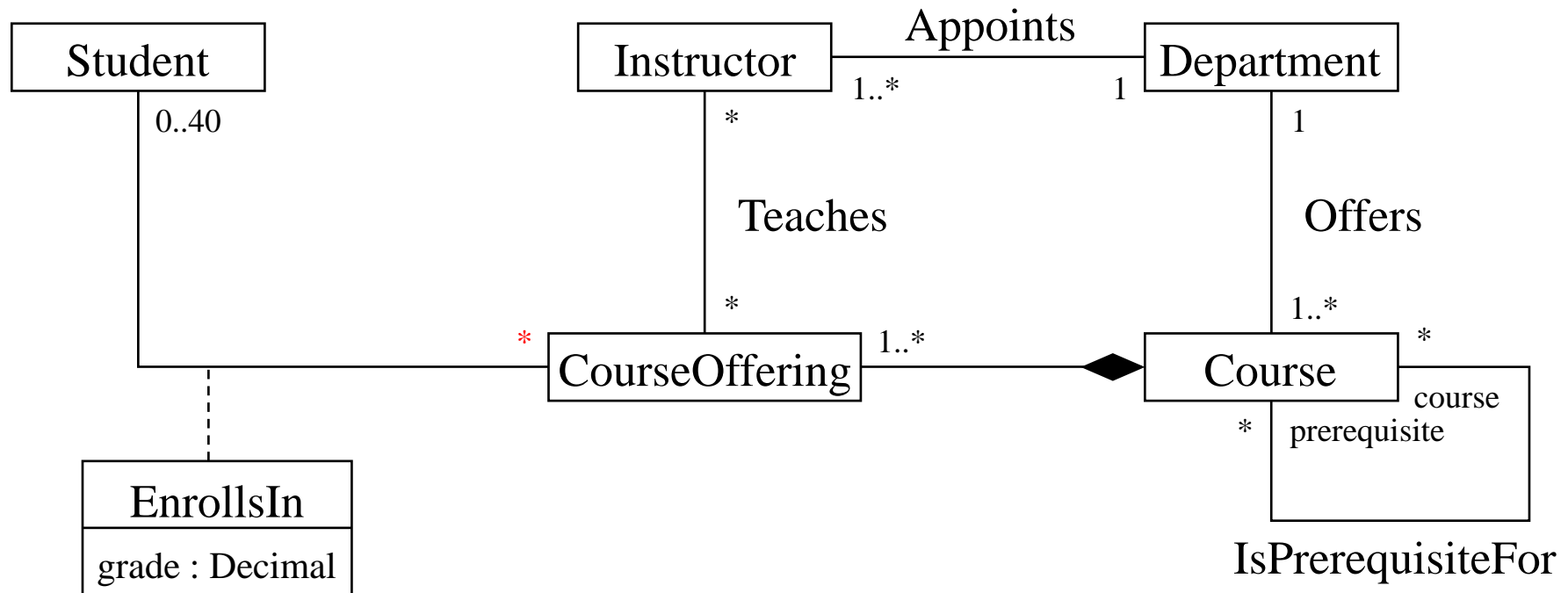
✎ A student can enroll in at most four course offerings *in one semester.*

- It is actually unknown the total number of course offerings in which a student will enroll.

✎ The max-card should be *\**.

- We need to *document outside the domain model* the fact that enrollment in a term should not be more than four course offerings (e.g., by using OCL).

# ASU DOMAIN MODEL DETAIL: ASSOCIATION MULTIPLICITY



# **ASU Course Registration System**

## **System Requirements Capture**

### **Domain Model Detail**

### **Generalization**

# ASU DOMAIN MODEL DETAIL: GENERALIZATION

Student
userId : String password : String userGroup : Integer surname : String otherNames : String address : String DOB : Date dateOfAdmission : Date levelOfStudy : String modeOfStudy : String yearOfStudy : Integer

Instructor
userId : String password : String userGroup : Integer surname : String otherNames : String address : String DOB : Date qualification : String dateOfAppointment : String

Department
code: String title : String

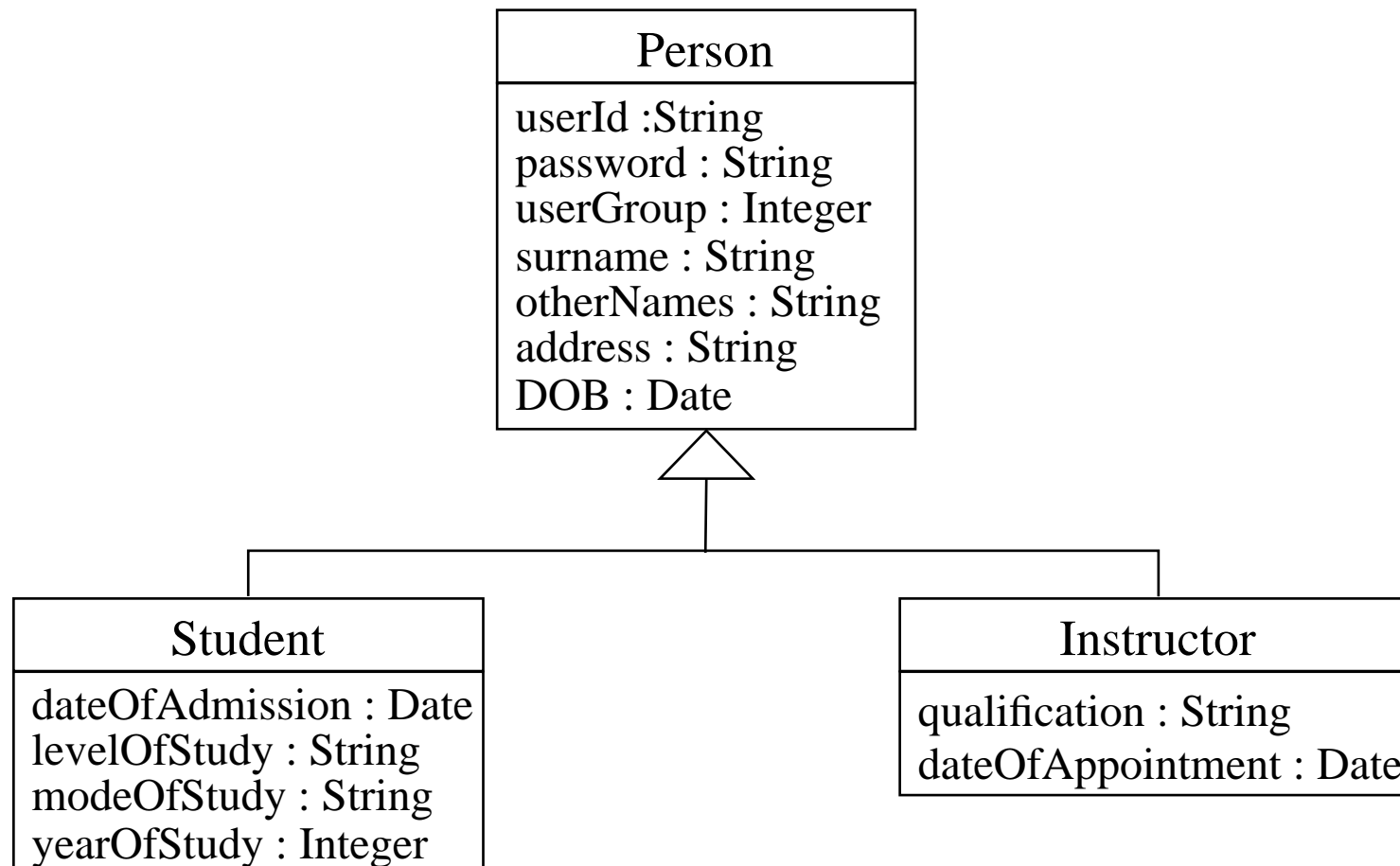
Course
courseCode : String title : String description: String credits : Integer

EnrollsIn
grade: Decimal

CourseOffering
offeringId : String term : String year : Integer

Look for common  
properties and  
semantics among  
classes.

# ASU DOMAIN MODEL DETAIL: GENERALIZATION



# ASU DOMAIN MODEL DETAIL: GENERALIZATION

