Database Systems Homework 1

"I have done this assignment completely on my own. I have not copied it, nor have I given my solution to anyone else. I understand that if I am involved in plagiarism or cheating, I will have to sign an official form that I have cheated and that this form will be stored in my official university record. I also understand that I will receive a grade of 0 for the involved assignment and my grade will be reduced by one level (e.g., from A to A- or from B+ to B) for my first offense, and that I will receive a grade of "F" for the course for any additional offense of any kind."

Sincerely,

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Question 1:

Discuss whether it is a good idea to create entity sets Undergraduate Students and Graduate Students and make them sub entity sets of Students in the ER diagram for the Student Registration System.

Answer:

It is a good idea to create entity sets for undergraduate and graduate students under Students entity which is a main entity. The reason behind is that generalizing undergraduate and graduate common attributes will make the work easier for data entry and processing. As both are students in single institutions, both type of students has same attributes and relationship which can be inherited in one entity i.e., Student.

Also, it helps to differentiate and assign TA to graduate students only. Also the undergraduate student can be enrolled only in undergraduate course and graduate student can be enrolled only in graduate course.

Question 2:

ER Diagram for Student Registration System.
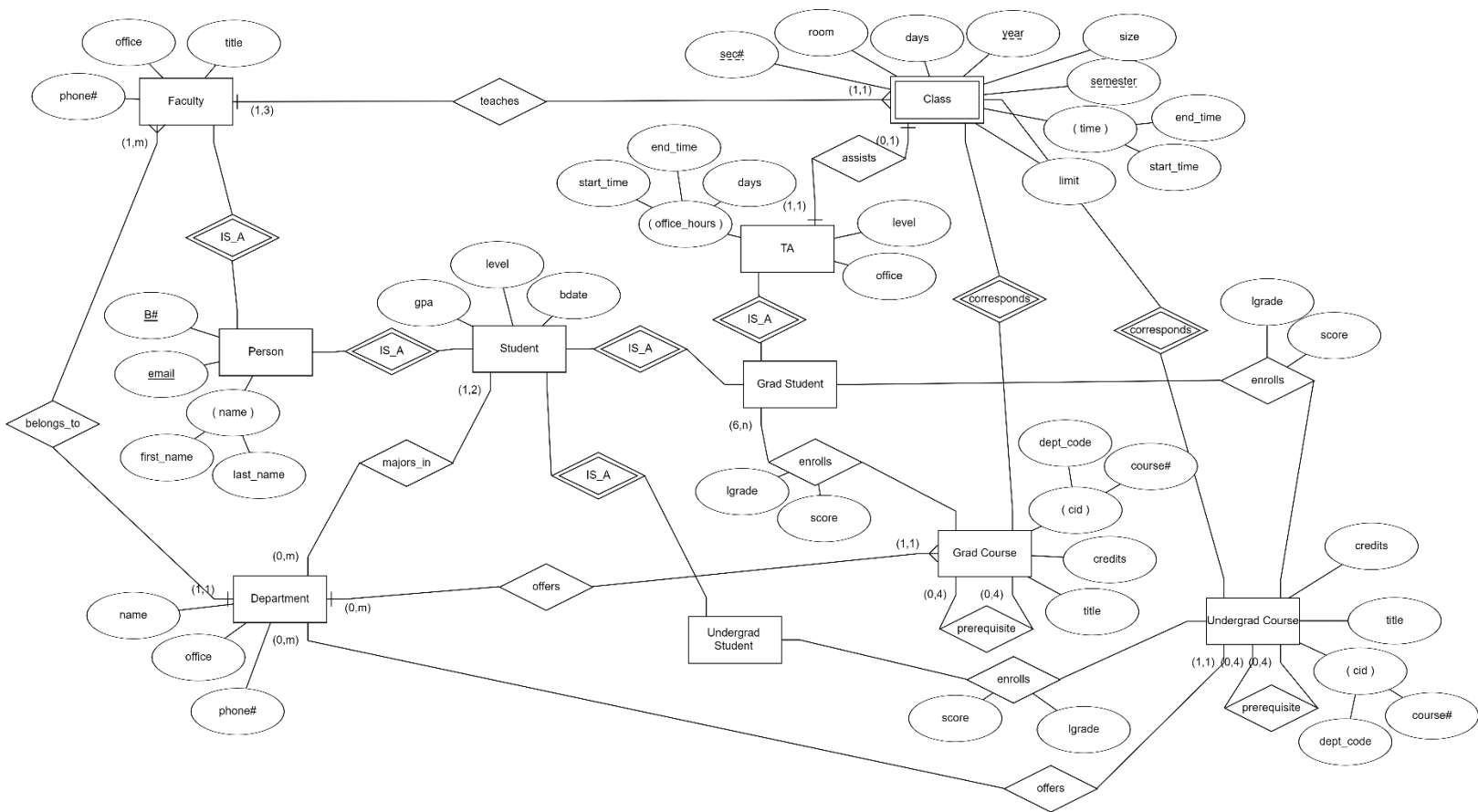
Question 3:

Identify constraints in the Requirements Document for the Student Registration System that cannot be naturally expressed using the ER model discussed in class. First list the constraints not represented in your ER diagram for each entity set separately. Then list the unrepresented constraints involving multiple entity sets or some relationship.

Answer:

Constraints that cannot be naturally represented in the ER diagram:

Students:

Valid values for level (freshman, sophomore, junior, senior, master, PhD).

Valid values for gpa (decimal number between 0 and 4).

The actual size of a class must not exceed the limit of the class.

Course:

course number format

credits hours

number of prerequisite courses

Class:

Valid values for days (Monday, Tuesday, etc)

Valid values for semester (Spring, Fall, Summer, Winter)

Enrollment

Valid values for letter grades (A, A-, B, etc)

Faculty

Valid values for faculty title (adjunct, lecturer, etc)

No faculty member can teach classes with overlapping times.

TA

Valid values for days (Monday, Tuesday, etc)

Level (sophomore, masters, etc)

The following are additional constraints that need to be maintained.

1. Courses and their prerequisite courses do not form cycles. For example, we cannot have: A is B's prerequisite, B is C's prerequisite and C is A's prerequisite.

2. The starting time of a class or an office hour must be earlier than the ending time of the class or the office hour.

3. The actual size of a class must not exceed the limit of the class.

4. No faculty member can teach classes with overlapping times.

5. For a student to be successfully registered in a class, the following conditions must all be satisfied:

a. The class still has room for new students, i.e., size < limit.

b. The student has not been registered in a different section of the same course.

c. The student has completed all the prerequisite courses with a grade of at least C.

d. The student has not already enrolled in five other classes (no student can enroll in more than five classes) in the same semester.

e. The time of the class does not overlap with the times of the classes the student has already enrolled in.