COMP 3005
Assignment #5
Due: Nov 15

Instruction

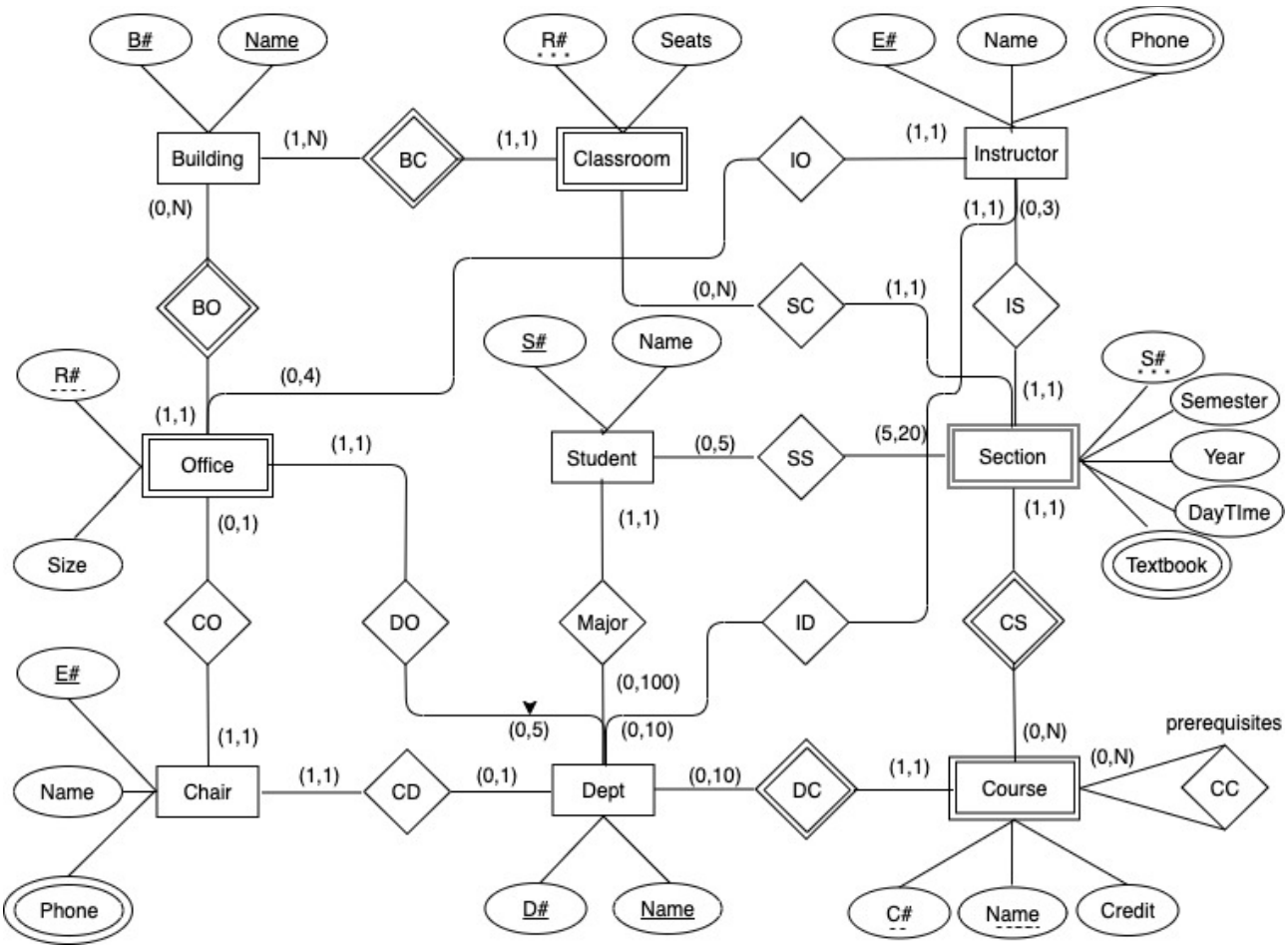
1. The assignment must be completed on an individual basis, and submitted as a single word/PDF file to **culearn**. Never email the assignment to the instructor or TAs!
2. There are two parts in this assignment. You don't need to use Oracle VM for this assignment.
3. You may use drawio (https://app.diagrams.net/) or DIA tool (https://sourceforge.net/projects/dia-installer/) to draw the ER/EER diagrams and the relational schema in Parts 1 and 2.
4. As DIA does not support underline, you can just use **Bold** for key and *Italics* for partial key. If you don't use DIA, then just follow the ER/EER models.

Part 1 ER (50 marks)

A university information system involves buildings, classrooms, offices, department, courses, sections, chairs, instructors, and students.

a) A building has a unique building number such as HP, a unique name, and a number of classrooms and offices.
b) A classroom has a room number such as 5125 that is unique in the building, the number of seats, and is either empty or used by a number of sections at different day and time.
c) An office has a room number that is unique in the building, the size in square feet, and is either empty, or occupied by a chair or up to 4 instructors.
d) A department has a unique dept code such as COMP, a unique name, 0 or 1 chair, 0 to 10 instructors, 0 to 100 students, 0 to 10 courses, 0 to 5 offices in same or different buildings and no offices are shared by different departments.
e) A course has a course number such as 3005 and name such as Databases that are unique in the department that offers the course, credit hours and a number of prerequisite courses. Courses are offered as sections and not all courses are offered.
f) A section has a unique section code such as A and B within the course, semester, year, classroom, day and time such as MW 11:55-12:55, TR 10:05-11:55, textbooks, and is related to one course, one instructor, and 5 to 20 students. Just consider current sections only.
g) A chair or an instructor has a unique employee number, a name, an office, 0 to 3 phone numbers, and can only work in one department. Note that a chair is not an instructor, vice versa. An instructor teaches 0-3 sections.
h) A student has a unique student number, a name, majors in one department and takes 0 to 5 sections.

1. Draw the ER diagram for this information system that can represent the constraints specified above. (30)
    a. 9 entities, adding or missing one -2. Weak entities wrong (no double rectangles) -1. For section, DayTime can be a composite attribute instead.
    b. Underline regular entity keys, dotted underline week entity partial keys -1 if not. Missing one or more attributes -1, adding one or more extra attributes -1 for an entity. textbook is multivalued -1 if not. Day&time should be a simple attribute -1 if not.
    c. 13 relationships, adding or missing one -1. Identifying relationships wrong (no double diamonds) -1, no two relationships have the same name -1 if so. If a relationship has one or both cardinality constraints wrong -1. Relationship does not need to use double line.



2. Map the generated ER diagram into relational schema. (20)
   a. There are 14 tables, missing or adding one -1
   b. Primary key not underlined, foreign key not pointing to the primary key, or missing attributes etc -1 for one relation

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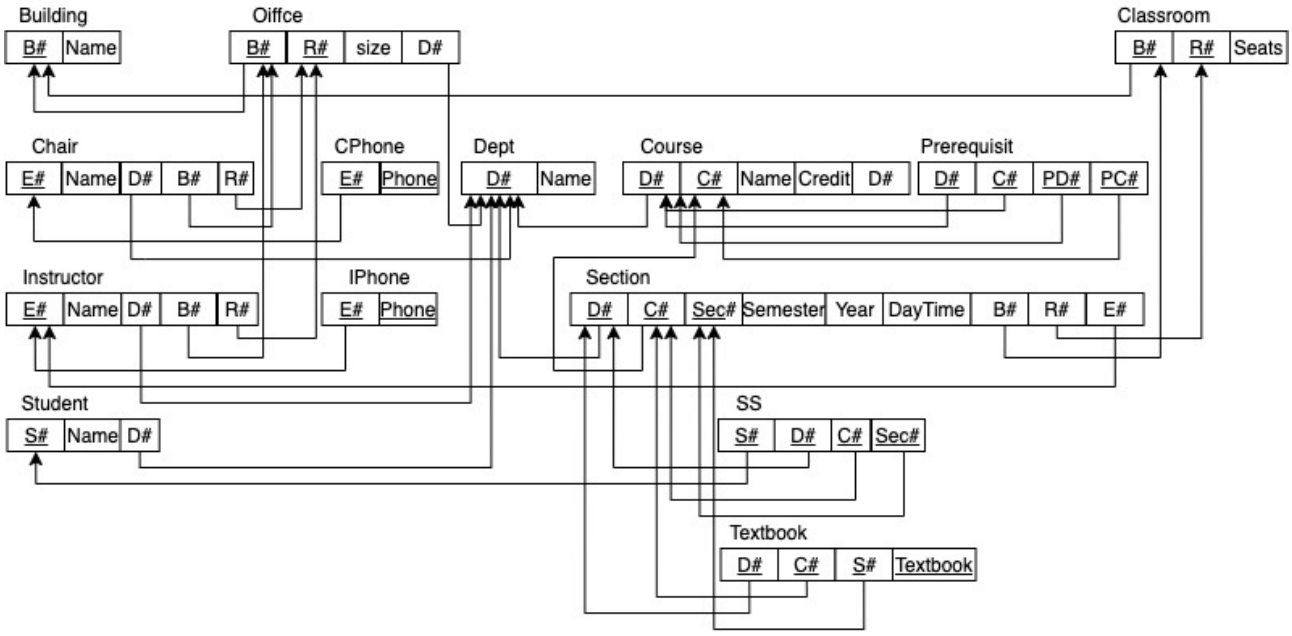
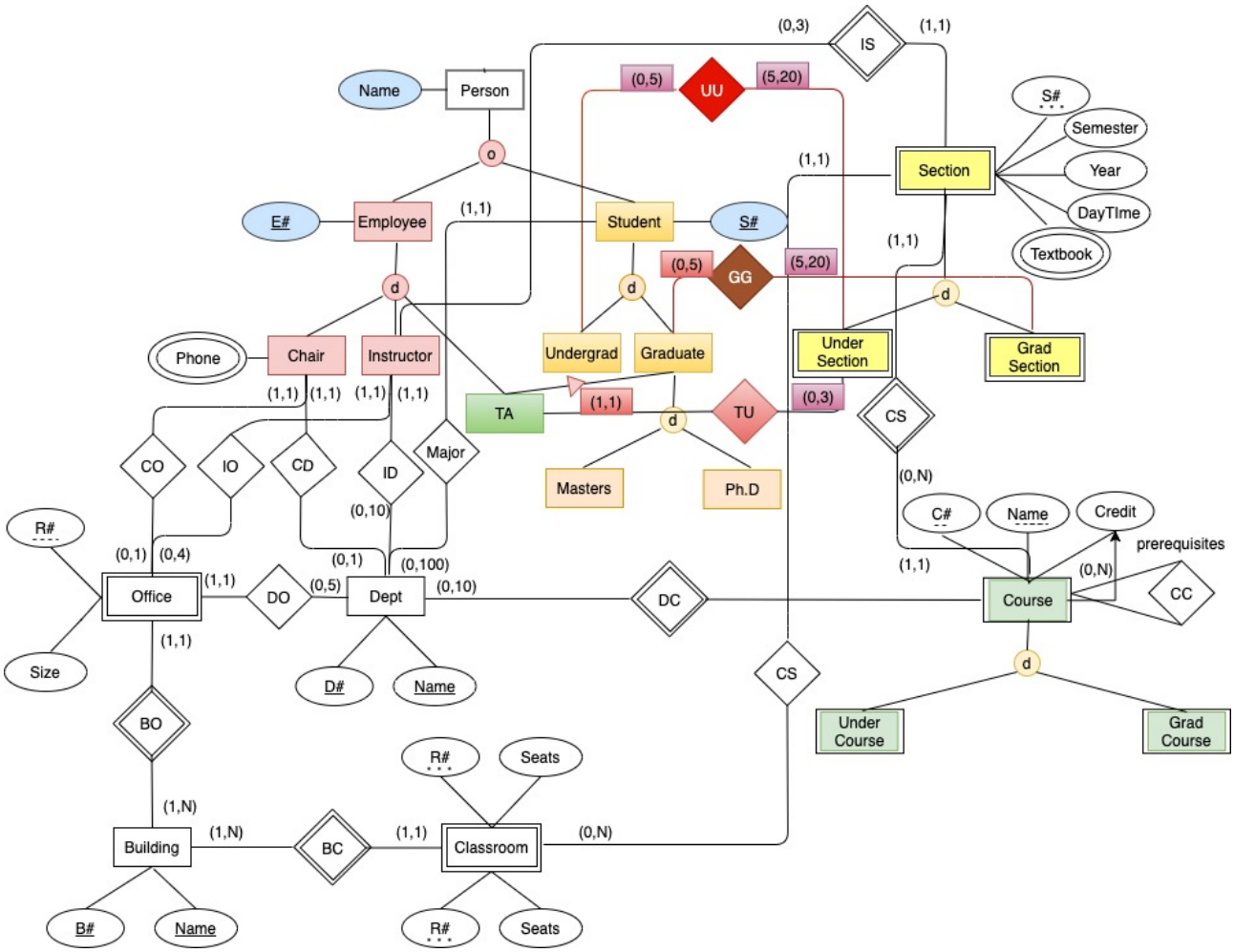


Part 2 EER (50 marks)

Extend the ER diagram created in Part 1 with following additional information.

a) A person is either a student or an employee. Person should just have a name
b) A student is either an undergraduate student or a graduate student. A graduate student is either a Masters student or a Ph.D student. Student should just have s#
c) An employee is either a chair, an instructor or a TA who is also a student, Employee should just have E#
d) A course is either an undergraduate course or a graduate course.
e) An undergraduate course section can have up to 3 TAs who are graduate students and is taken only by undergraduate students.
Sections should also have subclasses in order to do this. TAs are graduate students.
f) A graduate student takes graduate course sections.

1. Redraw the EER diagram for this information system that can represent the constraints specified above. (30)
Mainly check the colored entities subclasses, attributes, and the cardinality constraints on relationships.



2. Map the generated ER diagram into relational schema. (20)

a. Most tables in ER mapping stay the same. Just need to deal with super-class and subclasses and relationship to them. Newly added tables or attributes are highlighted.
b. A person is either an employee or a student so there is no need to create a person table
c. Employee is partitioned into three subclasses: Chair, Instructor and TA, we just need to add a new relation TA.
d. TA has many to one relationship to Graduate Section, we need to add section info into the TA table. If done differently -2. If missing or adding an attribute in TA -1 for each attribute. Note as there is no separate relation for graduate and graduate section, we cannot represent the relationship that a graduate student takes graduate course sections.
e. Although Student is partitioned into Undergrad and Graduate, they have the same attributes. Thus, it is not a good idea to create two separate relations for them. It is better to use SType attribute to indicate the status. As a graduate may be a TA, also added a TAFlag. If done differently -2.
f. The course and section cases are similar, so just need to add CType to Course and SType to section. If done differently -2