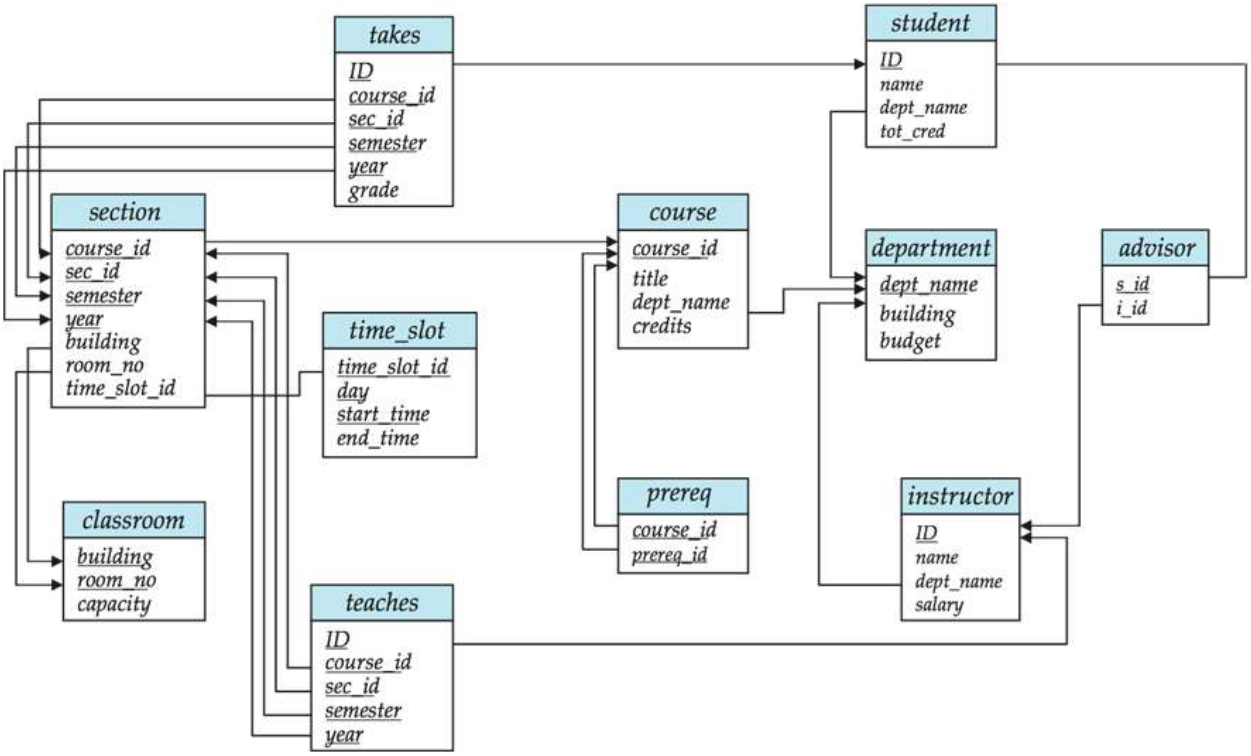
More Practice for CMPSC 430

Refer to this schema diagram for a university database shown below, and described the textbook. Use this schema as you answer questions for the exam.



Express each of the following queries as relational algebra expressions. (5 points each)

Find the names of all instructors who have taught, or are teaching, the course with the title "Database Design". Do not use any natural joins in your answer.

Find the IDs of all students who have taken a course in a building that is different than the building where their department is located. Use at least one of the set operations ($\cup$, $\cap$, or -) in your query.

Express the following queries in **BOTH relational algebra AND SQL**.

Find the room numbers of all classrooms in the Olmsted building with a capacity of more than 30.

Relational Algebra Expression (5 points):

SQL Query (10 points):

Express the following queries in **BOTH relational algebra AND SQL**.

Find all room numbers in Olmsted building that have the same capacity as Olmsted 252.

Relational Algebra Expression (10 points):

SQL Query (15 points):

Give an SQL statement that adds a department_course relation to the database. This relation will store the list of all courses that could be taken by students in each department. The attributes should include the department, the course ID, and a field that is 'Y' if the course is a required one or 'N' if the course is an elective. Your statement must specify that no attributes are allowed to be null in this relation, identify a suitable primary key, and indicate appropriate foreign key(s). (10 points)

Assuming that the department_course relation has been created as specified by the previous problem. Generate a list of student IDs and the *course IDs of the* **required** courses in their department that each student has not yet *attempted*. (15 points)

Express each of the following queries in SQL.

Find the name of all instructors who have taught or are teaching a course taken by the student Elvis Presley. (15 points)

Generate a list of IDs, names, and salaries of instructors who make less than the average salary for an instructor. (15 points)

Find the course title for the course that has been offered the most times. If there are multiple courses that have been offered this maximum of times, you must list all of them. *Note: distinct courses may have the same title.* (15 points)