**Group Assignments**

(One problem assigned to each group**)**

Problem 1.

A university database contains information about professors (identified by social security number, or SSN) and courses (identified by courseid). Professors teach courses; each of the following situations concerns the Teaches relationship set. For each situation, draw an ER diagram that describes it (assuming no further constraints hold).

1. Professors can teach the same course in several semesters, and each offering must be recorded.
2. Professors can teach the same course in several semesters, and only the most recent such offering needs to be recorded. (Assume this condition applies in all subsequent questions.)
3. Every professor must teach some course.
4. Every professor teaches exactly one course (no more, no less).
5. Every professor teaches exactly one course (no more, no less), and every course must be taught by some professor.

**Assignment 1**

Now suppose that certain courses can be taught by a team of professors jointly, but it is possible that no one professor in a team can teach the course. Model this situation, introducing additional entity sets and relationship sets if necessary.

**Assignment 2**

Considering the problem 1, provide a logical design of the university database. Your design output must capture all the entities, relationships, and all the necessary constrains.

**Assignment 3**

Consider the scenario from problem 1, where you designed an ER diagram for a university database. Write SQL statements to create the corresponding relations and capture as many of the constraints as possible. If you cannot capture some constraints, explain why?

**Problem 2**

Consider the following information about a university database:

1. Professors have an SSN, a name, an age, a rank, and a research specialty.
2. Projects have a project number, a sponsor name (e.g., NSF), a starting date, an ending date, and a budget.
3. Graduate students have an SSN, a name, an age, and a degree program (e.g., M.S. or Ph.D.).
4. Each project is managed by one professor (known as the project’s principal investigator).
5. Each project is worked on by one or more professors (known as the project’s co-investigators).
6. Professors can manage and/or work on multiple projects.
7. Each project is worked on by one or more graduate students (known as the project’s research assistants).
8. When graduate students work on a project, a professor must supervise their work on the project. Graduate students can work on multiple projects, in which case they will have a (potentially different) supervisor for each one.
9. Departments have a department number, a department name, and a main office.
10. Departments have a professor (known as the chairman) who runs the department
11. Professors work in one or more departments, and for each department that they work in, a time percentage is associated with their job.
12. Graduate students have one major department in which they are working on their degree.
13. Each graduate student has another, more senior graduate student (known as a student advisor) who advises him or her on what courses to take.

**Assignment 1**

Design and draw an ER diagram that captures the information about the university. Use only the basic ER model here; that is, entities, relationships, and attributes. Be sure to indicate any key and participation constraints.

**Assignment 2**

Considering the problem 2, provide a logical design of the university database. Your design output must capture all the entities, relationships, and all the necessary constrains.

**Assignment 3**

Consider the university database from problem 2 and the ER diagram you designed. Write SQL statements to create the corresponding relations and capture as many of the constraints as possible. If you cannot capture some constraints, explain why?