HOMEWORK #1
Due in class: February 3, 2015

1. Design a database for a university to include information about professors and courses. Professors are identified by social security number, SSN; and courses are identified by course ID. Professors teach courses. For each of the following situations concern the Teaches relationship set, draw an ER diagram to describe it (assuming no further constraints hold):
   - Professors can teach the same course in several semesters, and each offering must be recorded
   - 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.)
   - Every professor must teach some course.
   - Every professor teaches exactly one course
   - Every professor teaches exactly one course, and every course must be taught by some professor

2. Computer Sciences Department frequent fliers have been complaining to Dane County Airport officials about the poor organization at the airport. As a result, the officials decided that all information related to the airport should be organized using a DBMS, and you have been hired to design the database. Your first task is to organize the information about all the airplanes stationed and maintained at the airport. The relevant information is as follows:
   - Every airplane has a registration number, and each airplane is of a specific model.
   - The airport accommodates a number of airplane models, and each model is identified by a model number and has a capacity and weight.
   - A number of technicians work at the airport. You need to store the name, SSN, address, and salary of each technician.
   - Each technician is an expert on one or more plan model(s), and his or her expertises may overlap with that of other technicians. This information about technicians must also be recorded.
   - Traffic controllers must have an annual medical examination. For each traffic controller, you must store the date of the most recent exam.
   - All airport employees (including technician) belong to a union. You must store the union membership number of each employee. You can assume that each employee is uniquely identified by a social security number.
   - The airport has a number of tests that are used periodically to ensure that airplanes are still airworthy. Each test has a Federal Aviation Administration (FAA) test number, a name, and a maximum possible score.
   - The FAA requires the airport to keep track of each time a given airplane is tested by a given technician using a given test. For each testing event, the information needed is the date, the number of hours the technician spent doing the test, and the score the airplane received on the test.
   - Draw an ER diagram for the airport database. Be sure to indicate the various attributes of each entity and relationship set; also specify the key and participation constraints for
each relationship set. Specify any necessary overlap and covering constraints as well (in English).

- The FAA passes a regulation that tests on a plane must be conducted by a technician who is an expert on that model. How would you express this constraint in the ER diagram? If you cannot express it, explain briefly.