CSCI 2020
Data Modeling
Notes

Given:

At TSU there are many students, and many professors and many classes. We need a database to hold information on each term's registrations. For each class we need to track its name, unique id code, credit hours and the number of sections of that course offered. Each section has multiple students, but a single instructor. The section has a unique id code. For each section's instructor we need a name, employee id, a list of degrees and a contact phone number. For each student we need their student id, name and contact phone number. We also need to know if they are a freshman, sophomore, junior or senior, and the grade they make in each course.

Step One: Find the big pieces
Things: TSU (But there is only one of these, it is the scope of the DB),
- Student
- Professor/Instructor
- Course/Classe
- Section

Links Registration (student to section) ***many*** students per section, ***many*** sections per student
- Teaches (professor to section) ***one*** professor per section, may be ***many*** sections per professor
- SectionOf (section to course) ***one*** course per section, ***many*** sections per course

Step Two: find the details for each of these big things

Things:
- Student student id, name, contact phone number, and standing.
- Professor/Instructor name, employee id, a list of degrees and a contact phone
- Course/Class name, unique id code, credit hours (number of sections via the link)
- Section unique id code

Links Registration (student to section) many students per section, many sections per student
- Grade for this student in this section
- Teaches (professor to section) one professor per section, may be man sections per professor
- SectionOf (section to course) one course per section, many sections per course

Now if list of degrees is always a single text 'blob' we can just leave it as is, if we want to handle each degree individually then it has to become its own table.

Step Three Build a table for each thing
Student

ID	Name	Phone	Standing

Professor

Emp_ID	Name	Phone	Degrees*

Course

ID	Name	CreditHours

Section

ID

Step Four:
Look at the Links
Teaches (professor to section) one professor per section, may be many sections per professor
SectionOf (section to course) one course per section, many sections per course

Both of these are similar, they link a single section to exactly one other thing (professor, course) since we know each row in the Section table will represent one section, if we add foreign keys pointing to the Professor and Course tables respectively this will link our section the way we want.:

Section

ID	BelongsTo	TaughtBy
	FK to Course	FK to Professor

However Registration is different one student might be in multiple sections, and one section will have multiple students in it. So this is going to need a table all its own with two foreign keys one pointing to a student, and one to a section. This also makes a great place to put the grade as it represents this student's performance in this course. If we assume that one student only ever has one recorded grade in a section then we can use the combination of the two foreign keys as the primary key for this table

Registration

TheSection	The Student	Grade
FK to Course	FK to Professor	

Now to deal with degrees, if we want to track each separately then rather than the degrees column in Professor we need to build what is called a detail table it has only 2 columns that make up the primary key of the table. The first is the id of the professor who owns this degree, and the second is the degree name. The first column will also serve as a foreign key to Professor.

Professor

Emp_ID	Name	Phone

Degree

Prof	Degree
FK to Professor	

So the final database looks like

Student

ID	Name	Phone	Standing

Professor

Emp_ID	Name	Phone

Degree

Prof	Degree
FK to Professor	

Course

ID	Name	CreditHours

Section

ID	BelongsTo	TaughtBy
	FK to Course	FK to Professor

Registration

TheSection	The Student	Grade
FK to Course	FK to Professor	

A good check at this point is to put some sample data into the tables and see if you can accommodate all of it correctly in your design.