

INFO 605: Final Project

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Requirements

I have been hired by a clone of Drexel University to trick students into signing up for classes through the fake Term Master Schedule. We need this to look as real as possible to trick them from signing up for their real classes.

We need to know the courses offered at the real Drexel University to trick the students. We need to know the courses' CRN and title. The CRN will help us uniquely identify the courses as that is how students register for courses.

The evil clone needs to know the names of professors that exist at Drexel University. They need to know them by their first name, last name, title, email, phone number, and office; they can only have one email address and phone number associated with them at any given time. Professors are uniquely identified by the combination of their first and last names. Professors can teach as many courses as possible, but each course must have at least one professor teaching it.

We need to know the description of courses. We identify each course description by their subject code and course number. We need the credit count and bulk description of the course. Every course must have one description.

Additionally, we need the courses to be hosted by their corresponding college. The colleges are identified by their subject code, but college and department are also needed. Colleges can host multiple courses, but a course is hosted by one college.

Students are associated with colleges. Students must belong in one or more colleges. Students are identified by their student ID, and we know them by their first and last names. Colleges may have no students belonging to them.

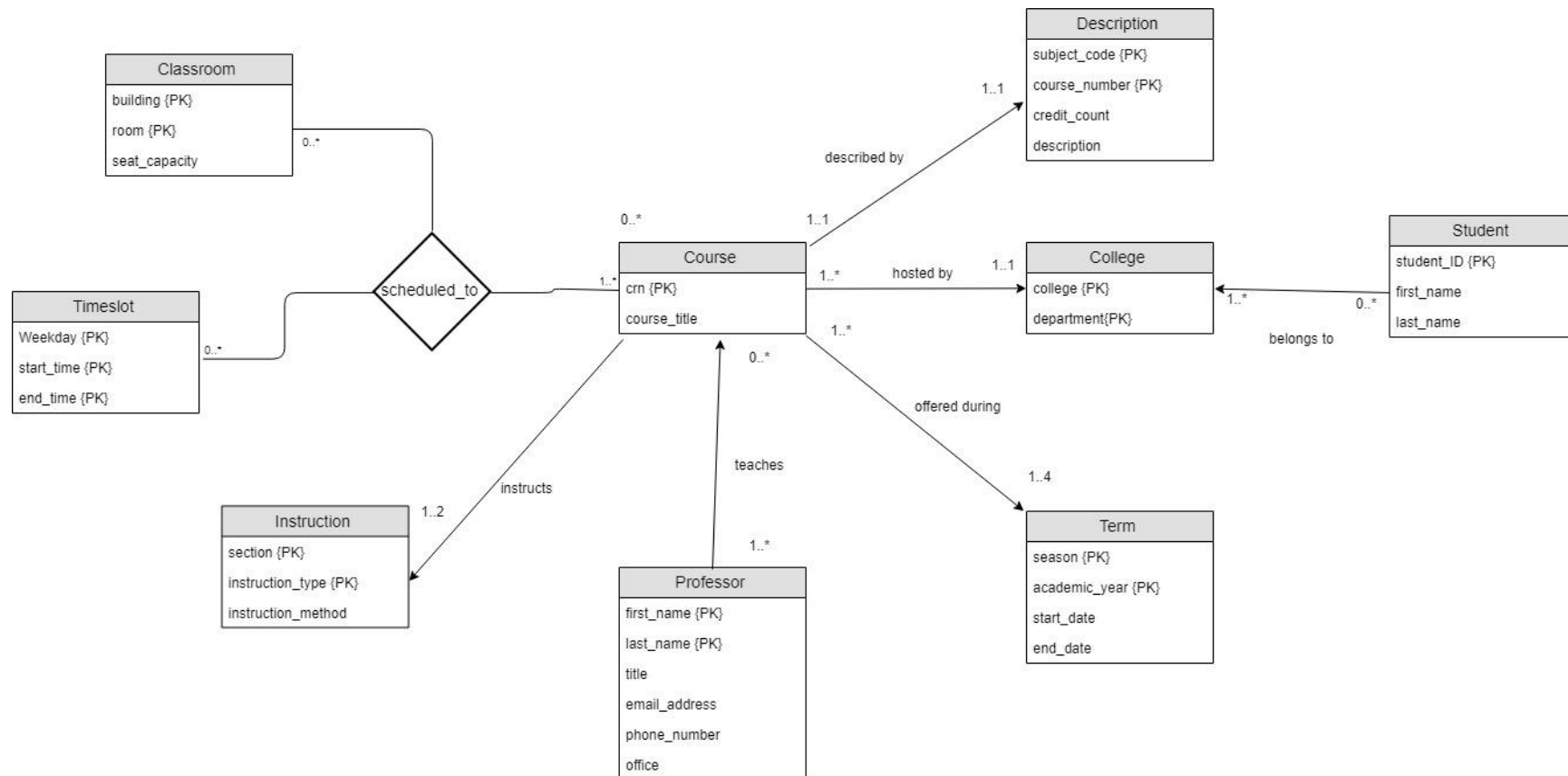
We need to identify the term the course is offered. Each term should be uniquely identified by their season and academic year. Additionally, we need their start and end date. A course can be offered during any season.

We need to know when the course is scheduled. Each time slot of the course should be uniquely identified by the day of the week, start and end time. Each course can have multiple time slots since different professors can teach a different version of the course, and there can be multiple courses running at the same time. Each course must have at least one time slot.

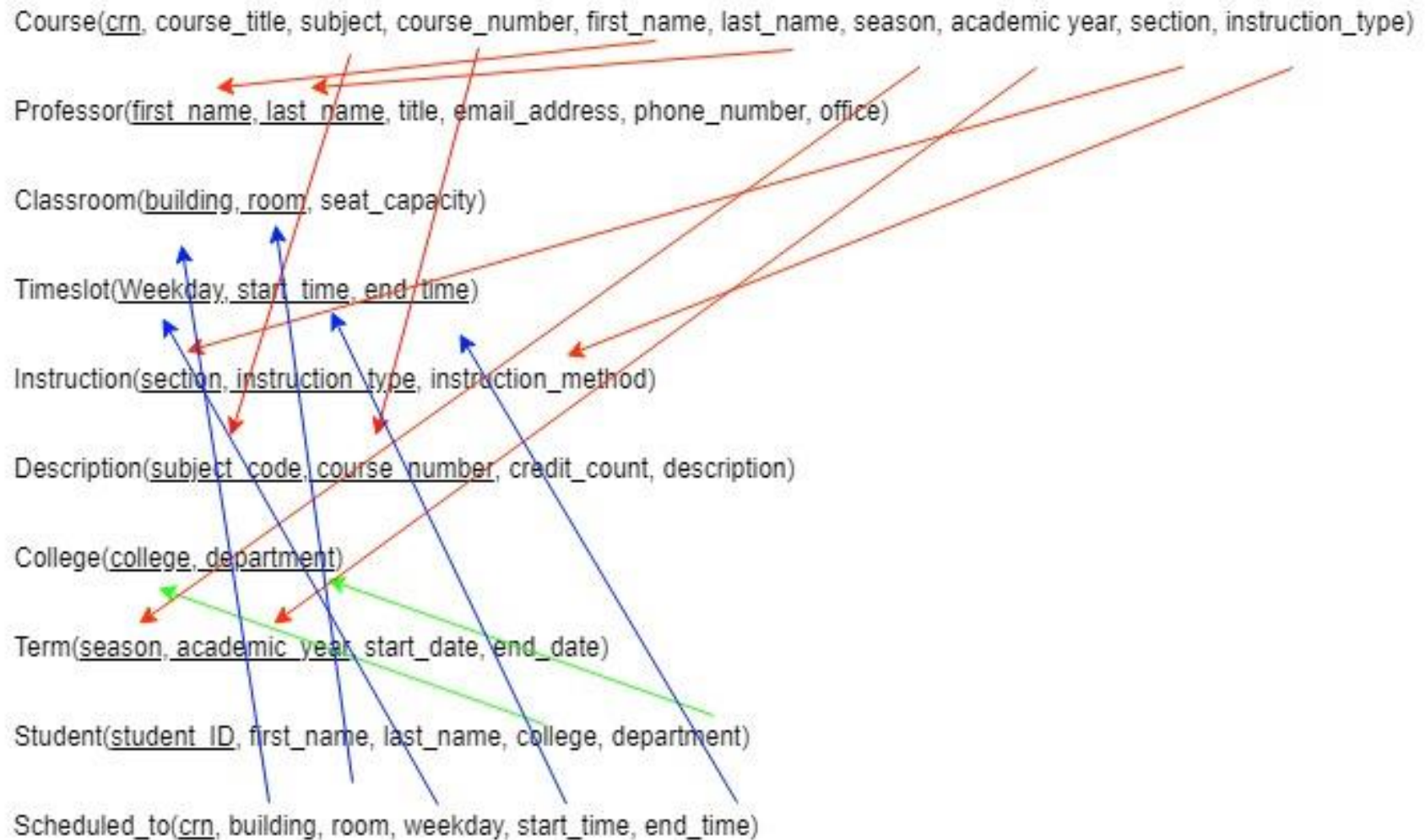
We also need to know which building the classrooms are scheduled in. Each classroom is identified by their building and room. We also need the seat capacity for each classroom. Each course must be in at least one classroom, but a classroom can host multiple courses.

Finally, we need to know the instruction type for the courses. We identify the course instructions by their section and instruction type. We also need to know the course's instruction method, either online or on campus. Each course can have at least one type of instruction, but there can exist multiple courses following that one instruction.

ER Model



Database Schema



Data Dictionary

Classrooms: Contains information about the building and room

Attribute Name	Description	Datatype	Domain	Nullable	PK	FK
building	building name	Varchar2(64)	All	No	Yes	No
room	room number	varchar2(8)	0 -999	No	Yes	No
seat_cap	Maximum amount of students	Integer	All	No	No	No

Timeslots: Contains schedules for courses

Attribute Name	Description	Datatype	Domain	Nullable	PK	FK
Weekday	Day of the Week	VARCHAR2(5)	M,T,W,R,F	Yes	Yes	No
start_time	Starting Time for Class	Char(8)	1am/pm-12am/pm	Yes	Yes	No
end_time	Ending Time for Class	Char(8)	1am/pm-12am/pm	Yes	Yes	No

Instructions: Contains the meeting type of course

Attribute Name	Description	Datatype	Domain	Nullable	PK	FK
sec	Section Number	varchar2(3)	1-999 or an alphabet (A, B, C...Z)	No	Yes	No
instr_type	Content of the Class	Varchar2(20)	Lab, Lecture, Recitation, Lecture & Recitation, Lecture & Lab	No	Yes	No
instr_method	Meeting Type for the Class	Varchar2(12)	Online, Face to Face, Hybrid	No	No	No

Professors: Containing Information of Professors From Drexel University

Attribute Name	Description	Datatype	Domain	Nullable	PK	FK
fname	First Name of Professor	Varchar2(32)	All	No	Yes	No
lname	Last Name of Professor	Varchar2(32)	All	No	Yes	No
title	Title of the Professor	Varchar2(64)	All	No	No	No
email	Email of the Professor	Varchar2(32)	All	No	No	No
phone	Office Phone of the Professor	varchar2(12)	All	Yes	No	No
office	Location of the Professor	Varchar2(32)	All	Yes	No	No

College: Information containing which department that hosts the class						
Attribute Name	Description	Datatype	Domain	Nullable	PK	FK
College	College of the course	Varchar2(64)	All	No	Yes	No
Department	Department of the course	Varchar2(64)	All	No	Yes	No

Student: Containing information about students at Drexel University						
Attribute Name	Description	Datatype	Domain	Nullable	PK	FK
student id	Student Unique ID	char(8)	8 digit int	No	Yes	No
fname	First Name of the Student	Varchar2(50)	All	No	No	No
lname	Last Name of the Student	Varchar2(50)	All	No	No	No
College	Information where the student's studies are located	Varchar2(50)	All	No	No	Yes
Department	Information which department the student is enrolled with	Varchar2(50)	All	No	No	Yes

Description: Information about the classes						
Attribute Name	Description	Datatype	Domain	Nullable	PK	FK
Subject	subject of the class	varchar2(4)	All	No	Yes	No
course_num	course number for the class	varchar2(4)	0-999	No	No	No
credit_count	amount of credits	float	0-20	No	No	No
college	Host of the Department	Varchar2(64)	All	No	No	No
department	Host of the Class	varchar2(64)	All	No	No	No
description	description of the course	varchar2(1024)	All	Yes	No	No

Terms: Information containing the quarter						
Attribute Name	Description	Datatype	Domain	Nullable	PK	FK
season	Name of the Quarter	Varchar2(6)	Fall,Winter,Spring Summer	No	Yes	No
academic_year	The year the class is offered	char(5)	17-18,18-19 etc	No	Yes	No
start_date	The first day of class	char(10)	YYYY-MM-DD, all	No	No	No
end_date	The last day of class	char(10)	YYYY-MM-DD, all	No	No	No

Courses: Information about the class

Attribute Name	Description	Datatype	Domain	Nullable	PK	FK
crn	Unique Number of the course	integer	all	No	Yes	no
course_title	Name of the course	Varchar2(64)	all	No	No	no
subject	Subject of the class	varchar2(4)	All	No	No	Yes
course_num	Course number for this class	varchar2(4)	0-999	No	No	Yes
fname	First name of the professor teaching this course	Varchar2(32)	All	No	No	Yes
lname	Last name of the professor teaching this course	Varchar2(32)	All	No	No	Yes
season	Name of the Quarter	Varchar2(6)	Fall, Winter, Spring Summer	No	No	Yes
academic_year	The year the class is offered	char(5)	17-18, 18-19 etc	No	No	Yes
sec	Section Number of this Course	varchar2(3)	1-999 or an alphabet (A, B, C...Z)	No	No	Yes
instr_type	Content of the Class	Varchar2(20)	Lab, Lecture, Recitation, Lecture & Recitation, Lecture & Lab	No	No	Yes

Scheduled_to: Information schedule of the courses

Attribute Name	Description	Datatype	Domain	Nullable	PK	FK
crn	Unique Number of the course	integer	all	No	Yes	No
building	building name	Varchar2(64)	All	No	No	Yes
room	room number	varchar2(8)	0 -999	No	No	Yes
weekday	Day of the Week	VARCHAR2(5)	M,T,W,R,F	Yes	No	Yes
start_time	Starting Time for Class	Char(8)	1am/pm-12am/pm	Yes	No	Yes
end_time	Ending Time for Class	Char(8)	1am/pm-12am/pm	Yes	No	Yes

DDL Prerequisites:

```
--FK tables first
Drop table scheduled_to;
Drop table courses;
Drop table descriptions;
--NONFK tables
Drop Table students;
Drop table colleges;
Drop Table classrooms;
Drop Table timeslots;
Drop table instructions;
Drop table professors;
Drop table terms;
```

set escape on

DDL

```
create table classrooms (
    building varchar2(64),
    room varchar2(8),
    seat_cap integer,
    constraint PK_classroom primary key (building, room));

create table timeslots (
    weekday varchar2(5),
    start_time char(8),
    end_time char(8),
    constraint PK_timeslots primary key (weekday,start_time,end_time));

create table instructions (
    sec varchar2(3),
    instr_type varchar2(20),
    class_format varchar2(12) not null,
    constraint PK_instructions primary key (sec, instr_type));

create table professors (
    fname varchar2(32),
    lname varchar2(32),
    title varchar2(64),
    email varchar2(32),
```

```

phone varchar2(12),
office varchar2(32),
constraint email_unique unique (email),
constraint PK_professors primary key (fname,lname));

```

```

create table colleges (
    college varchar2(64) not null,
    department varchar2(64) not null,
    constraint pk_colleges primary key(college,department));

```

```

create table students(
    id char(8) primary key,
    fname varchar2(32),
    lname varchar2(32),
    college varchar2(64) not null,
    department varchar2(64) not null,
    constraint fk_colleges foreign key(college,department) references
    colleges(college,department));

```

```

create table descriptions (
    subject varchar2(4),
    course_num varchar2(4),
    credit_count float not null,
    college varchar2(64) not null,
    department varchar2(64) not null,
    description varchar2(1024),
    constraint fk_college foreign key (college,department) references
    colleges(college,department) ON DELETE CASCADE,
    constraint PK_description primary key (subject, course_num));

```

```

create table terms (
    season varchar2(6),
    academic_year char(5),
    start_date char(10) not null,
    end_date char(10) not null,
    constraint PK_term primary key (season, academic_year));

```

```

create table Courses(
    crn integer primary key,
    course_name varchar2(64) not null,
    subject varchar2(4) not null,           -- FOREIGN
    course_num varchar2(4) not null,       -- FOREIGN
    fname varchar2(32) not null,           -- FOREIGN
    lname varchar2(32) not null,           -- FOREIGN

```

```

        season varchar2(6) not null,           -- FOREIGN
        academic_year char(5) not null,        -- FOREIGN
        sec varchar2(3) not null,              -- FOREIGN
        instr_type varchar2(20) not null,      -- FOREIGN
        constraint fk_descriptions foreign key (subject, course_num) references
Descriptions(subject, course_num) ON DELETE CASCADE,
        constraint fk_professors foreign key (fname, lname) references Professors(fname,
lname) ON DELETE CASCADE,
        constraint fk_terms foreign key (season, academic_year) references Terms(season,
academic_year) ON DELETE CASCADE,
        constraint fk_instructions foreign key (sec, instr_type) references Instructions(sec,
instr_type) ON DELETE CASCADE
);

create table scheduled_to (
    crn integer primary key,
    building varchar2(64),           -- FOREIGN
    room varchar2(8),               -- FOREIGN
    weekday varchar2(5),            -- FOREIGN
    start_time char(8),             -- FOREIGN
    end_time char(8),               -- FOREIGN
    constraint fk_courses foreign key (crn) references courses(crn) ON DELETE CASCADE,
    constraint fk_classrooms foreign key (building, room) references classrooms(building,
room) ON DELETE CASCADE,
    constraint fk_timeslots foreign key (weekday, start_time, end_time) references
timeslots(weekday, start_time, end_time) ON DELETE CASCADE
);

```

DML

```
insert into colleges values ('College of Computing and Informatics', 'Computer Science');
insert into colleges values ('College of Engineering', 'Elec \& Computer Engr');
insert into colleges values ('College of Arts and Sciences', 'Mathematics');
```

```
insert into students values ('11111111','Tristan','Leung','College of Computing and Informatics',
'Computer Science');
insert into students values ('11111112','Kenny','Choi','College of Engineering', 'Elec \&
Computer Engr');
insert into students values ('11111113','John','Doe','College of Arts and Sciences',
'Mathematics');
insert into students values ('11111114','Random','Guy','College of Engineering', 'Elec \&
Computer Engr');
```

```
insert into terms values('Winter','18-19','2019-01-07','2019-03-23');
insert into terms values('Fall','18-19','2018-09-24','2019-12-08');
insert into terms values('Spring','18-19','2019-04-01','2019-06-15');
--insert into terms values ('Summer', '17-18', '2018-06-25', '2018-09-04');
```

```
--Winter 2019--
```

```
--ECEC WINTER 2019
```

```
insert into classrooms values('Randell Hall', '327',30);
insert into timeslots values('W','06:00pm','08:50pm');
insert into instructions values ('001','Lecture','Face To Face');
insert into Professors values ('Prawat', 'Nagvajara', 'Associate Professor',
'nagvajara@coe.drexel.edu', '215-895-2378', 'Bossone 103');
insert into descriptions values ('ECEC','661',3.00,'College of Engineering', 'Elec \& Computer
Engr','A project-based course on design concepts, tools and implementation of systems with
embedded processors, library IP (Intellectual Property) cores and custom IP cores, synthesis
and Field Programmable Gate Array (FPGA) implementation.');
```

```
insert into courses values(26032,'Digital System Design','ECEC','661','Prawat',
'Nagvajara','Winter','18-19','001','Lecture');
insert into scheduled_to values (26032,'Randell Hall', '327','W','06:00pm','08:50pm');
```

```
insert into classrooms values ('Bossone Research Enterprise Center', '605', 40);
insert into instructions values ('A','Lecture','Face To Face');
insert into Professors values ('Baris', 'Taskin', 'Professor', 'taskin@coe.drexel.edu', '215-895-
5972', 'Bossone 413F');
insert into descriptions values ('ECEC','574',3.00,'College of Engineering', 'Elec \& Computer
Engr','This course will focus exclusively on digital CMOS Application Specific Integrated Circuit
(ASIC) systems design and automation. The ASIC physical design flow, including logic
synthesis, floorplanning, placement, clock tree synthesis, routing and verification will be
presented. These back-end physical design flow steps will also be covered through hands-on
```

practice using industrial VLSI CAD tools. Contemporary design practices will be reviewed and presented in experiments.');

insert into instructions values ('060','Lab','Face To Face');

insert into timeslots values('M','09:00am','10:50am');

insert into timeslots values('T','09:00am','10:50am');

insert into instructions values ('061','Lab','Face To Face');

insert into timeslots values('W','09:00am','10:50am');

insert into courses values(25517, 'ASIC Design I', 'ECEC', '574', 'Baris', 'Taskin','Winter','18-19','060','Lab');

insert into courses values(25519, 'ASIC Design I', 'ECEC', '574', 'Baris', 'Taskin','Winter','18-19','061','Lab');

insert into courses values(25521, 'ASIC Design I', 'ECEC', '574', 'Baris', 'Taskin','Winter','18-19','A','Lecture');

insert into scheduled_to values (25517,'Bossone Research Enterprise Center', '605','T','09:00am','10:50am');

insert into scheduled_to values (25519,'Bossone Research Enterprise Center', '605','W','09:00am','10:50am');

insert into scheduled_to values (25521,'Randell Hall', '327','M','09:00am','10:50am');

--CS WINTER 2019

insert into classrooms values('Science Center 3401 Market St', '326',42);

insert into timeslots values('T','06:30pm','09:30pm');

insert into Professors values ('Matthew', 'Burlick', 'Assistant Teaching Professor', 'mjb528@drexel.edu', '215.571.4468', 'University Crossings 137');

insert into descriptions values ('CS','613',3.00,'College of Computing and Informatics', 'Computer Science','This course studies modern statistical machine learning with emphasis on Bayesian modeling and inference. Covered topics include fundamentals of probabilities and decision theory, regression, classification, graphical models, mixture models, clustering, expectation maximization, hidden Markov models, Kalman filtering, and linear dynamical systems.');

insert into instructions values ('900','Lecture','Online');

insert into classrooms values('TBD', 'TBD',30);

insert into timeslots values('TBD','TBD','TBD');

insert into Courses values (25824, 'Machine Learning', 'CS', '613', 'Matthew', 'Burlick','Winter','18-19', '001', 'Lecture');

insert into Courses values (25825, 'Machine Learning', 'CS', '613', 'Matthew', 'Burlick','Winter','18-19','900', 'Lecture');

insert into scheduled_to values (25824,'Science Center 3401 Market St', '326','T','06:30pm','09:30pm');

insert into scheduled_to values (25825,'TBD', 'TBD','TBD','TBD','TBD');

--MATH Winter 2019

```
insert into classrooms values('One Drexel Plaza','GL47',18);
insert into timeslots values('MWF','01:00pm','01:50pm');
insert into Professors values ('Yixin', 'Guo', 'Associate Professor', 'yixin@math.drexel.edu',
'215.895.2581', 'Academic 317');
insert into Descriptions values ('MATH', '623', 3.00, 'College of Arts and Sciences',
'Mathematics', 'Covers existence and uniqueness theorems, properties of solutions, adjoint
equations, canonical forms, asymptotic behavior, phase space, method of isocline, classification
of singular points, linear two-dimensional autonomous systems, non-linear systems, stability
theory, Lyapunovs methods, quadratic forms, construction of Lyapunovs function, boundedness,
limit sets, applications to controls, linear equations with periodic coefficients, Floquet theory,
characteristic multipliers and exponents, existence of periodic solutions to weakly non-linear
systems, jump phenomena, subharmonic resonance, and stability of periodic solutions.');
```

```
insert into Courses values (25608, 'Ordinary Differential Equations I', 'MATH', '623', 'Yixin',
'Guo', 'Winter', '18-19', '001', 'Lecture');
```

```
insert into scheduled_to values (25608, 'One Drexel Plaza', 'GL47', 'MWF', '01:00pm', '01:50pm');
```

--Fall 2019--

```
insert into Professors values ('Jaudelice', 'Oliveira', 'Associate Professor', 'jau@coe.drexel.edu',
'215-895-2248', 'Bossone 202');
```

```
insert into timeslots values('TR','02:00pm','03:20pm');
```

```
insert into Descriptions values ('ECEC', '531', 3.00, 'College of Engineering', 'Elec \& Computer
Engr', 'Principles of circuit switching, packet switching and virtual circuits; protocol layering;
application layer protocols for e-mail and web applications; naming and addressing; flow control
and congestion avoidance with TCP; Internet Protocol (IP); routing algorithms; router
architectures; multicast protocols; local area network technologies and protocols; issues in
multimedia transmissions; scheduling and policing; Quality-of-Service and emerging Internet
service architectures; principles of cryptography.');
```

```
insert into Courses values (16391, 'Principles of Computer Networking', 'ECEC', '531',
'Jaudelice', 'Oliveira', 'Fall', '18-19', '001', 'Lecture');
```

```
insert into scheduled_to values (16391, 'Randell Hall', '327', 'TR', '02:00pm', '03:20pm');
```

```
insert into Courses values (12345, 'Principles of Computer Networking', 'ECEC', '531',
'Jaudelice', 'Oliveira', 'Spring', '18-19', '001', 'Lecture');
```

```
insert into scheduled_to values (12345, 'Randell Hall', '327', 'TR', '02:00pm', '03:20pm');
```

```
insert into timeslots values('W','06:00pm','09:00pm');
```

```
insert into Professors values ('Christopher', 'Peters', 'Teaching Professor',
'cpeters@coe.drexel.edu', '215-895-6604', 'Bossone 512');
```

```
insert into Descriptions values ('ECEL', '301', 2.00, 'College of Engineering', 'Elec \& Computer
Engr', 'Offers laboratory experiences in each of the five ECE tracks: computers,
controls/robotics, electronics, power and energy, and telecommunications. Each lab consists of
a stand-alone module containing: lecture material providing basic theory, references, and
laboratory experiments. This is a writing intensive course.');
```

```
insert into Classrooms values ('Bossone Research Enterprise Center', '205', 70);
```

```

insert into instructions values ('001','Lecture \& Lab','Face To Face');
insert into Courses values (10085, 'Electrical Engineering Laboratory', 'ECEL', '301',
'Christopher', 'Peters', 'Fall', '18-19', '001', 'Lecture \& Lab');
insert into scheduled_to values (10085, 'Bossone Research Enterprise Center', '205',
'W','06:00pm','09:00pm');

```

--Spring 2019

```

insert into Professors values ('Nagarajan', 'Kandasamy', 'Professor', 'kandasamy@drexel.edu',
'215-895-1996', 'Bossone 603');
insert into Descriptions values ('ECEC', '413', 3.00, 'College of Engineering', 'Elec \& Computer
Engr', 'This course provides an introduction to the fundamental principles and engineering trade-
offs involved in designing modern parallel computers (multi-processors). Topics covered
include, but are not limited to, shared-memory and message-passing programming, cache-
coherence, synchronization, scalable distributed memory multi-processors, and interconnection
techniques.');
```

```

insert into timeslots values('TR','12:30pm','01:50pm');
insert into Courses values (23909, 'Introduction to Parallel Computer Architecture', 'ECEC',
'413', 'Nagarajan', 'Kandasamy', 'Winter', '18-19', '001', 'Lecture');
insert into scheduled_to values (23909, 'TBD', 'TBD', 'TR','12:30pm','01:50pm');

```

```

insert into Professors values ('Vasilis', 'Gkatzelis', 'Assistant Professor', 'gkatz@drexel.edu',
'215.895.5875', 'University Crossings 100B');

```

```

insert into Professors values ('Colin', 'Gordon', 'Assistant Professor', 'csgordon@cs.drexel.edu',
'215.571.4360', 'University Crossings 100A');
insert into Descriptions values('CS','647',3.00,'College of Computing and Informatics', 'Computer
Science','In-depth discussion of fundamental concepts of distributed computer systems. Covers
development techniques and runtime challenges, with a focus on reliability and system
validation techniques. Subjects discussed include: interprocess communication, remote
procedure calls and method invocation, middleware, distributed services, coordination,
transactions, replication and weak data consistency models. Significant system-building term
project in Java or similar language.');
```

```

insert into timeslots values('T','03:00pm','05:50pm');
insert into Courses values (35154, 'Distributed Systems Software', 'CS', '647', 'Colin',
'Gordon','Spring','18-19', '001', 'Lecture');
insert into Courses values (35143, 'Distributed Systems Software', 'CS', '647', 'Colin',
'Gordon','Spring','18-19','900', 'Lecture');
insert into scheduled_to values (35154, 'Science Center 3401 Market St', '326',
'T','03:00pm','05:50pm');
insert into scheduled_to values (35143,'TBD', 'TBD','TBD','TBD','TBD');

```


Queries

1.

Business Value: Allows user to find how many offering of a certain course exist in all the terms in our database. Useful for planning a course of study ahead of time.

--Q1

```
select C.season, C.academic_year, count(*)
from Courses C, Terms T
where C.season = T.season
and C.academic_year = T.academic_year
and C.subject = 'ECEC'
and C.course_num = '531'
group by C.season, C.academic_year ;
```

Output:

SEASON	ACADE	COUNT(*)
Fall	18-19	1
Spring	18-19	1

2.

Business Value: Query that searches the database for the term and amount of courses that our favorite professor teaches

--Q2

```
select C.season, C.academic_year, count(*)
from Courses C, Professors P
where C.fname = P.fname
and C.lname = P.lname
and C.fname = 'Colin'
and C.lname = 'Gordon'
group by C.season, C.academic_year;
```

	SEASON	ACADEMIC_YEAR	COUNT(*)
1	Spring	18-19	2

3.

Business Value: Query the database for the term and subject that offers a course on a certain day. Useful to fill up a schedule for the next quarter.

--Q3

```
select C.subject, C.course_num, C.season, C.academic_year, S.weekday, I.class_format
from Courses C, Terms T, scheduled_to S, Instructions I
where T.season = 'Winter'
and C.season = T.season
and C.crn = S.crn
and C.subject = 'ECEC'
and C.sec = I.sec
and S.weekday like '%T%'
group by C.season, C.academic_year, C.subject, C.course_num, S.weekday, I.class_format ;
```

	SUBJECT	COURSE_NUM	SEASON	ACADEMIC_YEAR	WEEKDAY	CLASS_FORMAT
1	ECEC	413	Winter	18-19	TR	Face To Face
2	ECEC	574	Winter	18-19	T	Face To Face

4.

Business Value: Find courses based on the level parameter that they set.

--Q4 shows undergraduate level classes

```
select Course.subject, Course.course_num, D.credit_count
from Courses Course, Descriptions D
where D.subject = Course.subject
and D.course_num = Course.course_num
and CAST(SUBSTR(Course.course_num, 1,3) AS NUMBER(3)) >= '300'
and CAST(SUBSTR(Course.course_num, 1,3) AS NUMBER(3)) <= '499'
group by Course.subject, Course.course_num, D.credit_count order by D.credit_count;
```

	SUBJECT	COURSE_NUM	CREDIT_COUNT
1	ECEL	301	2
2	ECEC	413	3

5.

Business Value: Query that searches for all the class offering from the department. Allows school admins to see which departments are lacking in courses.

--Q5

```
select D.college, D.department, D.subject, count(*)
from Descriptions D, Courses C, Terms T
where D.subject = C.subject
and D.course_num = C.course_num
and C.season = T.season
and C.academic_year = T.academic_year
group by D.college, D.department, D.subject order by count(*) desc;
```

	COLLEGE	DEPARTMENT	SUBJECT	COUNT(*)
1	College of Engineering	Elec & Computer Engr	ECEC	7
2	College of Computing and Informatics	Computer Science	CS	4
3	College of Engineering	Elec & Computer Engr	ECEL	1
4	College of Arts and Sciences	Mathematics	MATH	1