Assignment Two: Database Management Systems

Objective:

This assignment is designed to assess your ability to perform structured queries on databases using Python and MySQL on a dataset titled "student_grades.csv". Through this assignment, you will gain hands-on experience in creating and updating SQL tables and developing reports.

Dataset Description:

The dataset contains the following variables:

Students_ID:	INT	Four digit number uniquely assigned to each student
Student_Birthdate:	DATE	Birthdate of the student
Student_First_Name:	VARCHAR (32)	Student's first name
Student_Last_Name:	VARCHAR (32)	Student's last name
Student_email:	VARCHAR (32)	Student's email
Student_Gender:	VARCHAR (6)	Student's gender
Student_Birth_Place:	VARCHAR (32)	Student's country of birth
Course_Code:	INT	Five digit number uniquely assigned to each course
Course_Name:	VARCHAR (128)	Course Name
Course_Offering:	VARCHAR (32)	Course offering semester
Course_Grade:	FLOAT	Student's grade in the course
Instractor_code:	INT	Three digit number uniquely assigned to each instructor
Instructor_First_Name:	VARCHAR (32)	Instructor's first name
Instructor_Last_Name:	VARCHAR (32)	Instructor's last name

• Instructor_Area:	VARCHAR (32)	Instructor's area of study
• Instructor_School:	VARCHAR (32)	Instructor's school
• Instructor_email:	VARCHAR (32)	Instructor's email

Tasks:

Task1: Database creation (5%)

1. Using phpMyAdmin, create a mySQL database.
2. Name the database “studentsgrades”
3. Create a database user with username= “SGUser” and password=”SGPassword”.
4. Grant all rights of database studentsgrades to user SGUser

Task2: Connect your Jupyter Notebook to MySQL server (5%)

1. Create a Jupyter Notebook
2. Stablish the connection to MySQL using the server address (localhost), database name (studentsgrades), username (SGUser), and password (SGPassworrd).

MAKE SURE THAT YOUR DATABASE MANAGEMENT SERVER IS RUNNING (STARTED)

Install (If you have not yet) and import required packages:

```
<COMPLETE THE CODE>
```

Load the ipython-sql Extension:

```
<COMPLETE THE CODE>
```

Connect to the Database:

```
<COMPLETE THE CODE>
```

Task 3: Create the following tables (7.5%)

Table Name: STUDENTS (0%)

Column Name	Column Data Type	Null/Not Null	Primary Key
Student_ID	INT	NOT NULL	PRIMARY KEY
Student_Birthdate	DATE	NOT NULL	
Student_First_Name	VARCHAR(32)	NOT NULL	
Student_Last_Name	VARCHAR(32)	NOT NULL	
Student_email	VARCHAR(32)	NOT NULL	
Student_Gender	VARCHAR(6)	NOT NULL	
Student_ Citizenship	VARCHAR(16)	NOT NULL	

```
CREATE TABLE IF NOT EXISTS STUDENTS (
     Student_ID          INT NOT NULL PRIMARY KEY,
     Student_Birthdate   DATETIME,
     Student_First_Name  VARCHAR(32),
     Student_Last_Name   VARCHAR(32),
     Student_email       VARCHAR(32),
     Student_Gender      VARCHAR(6),
     Student_Citizenship VARCHAR(16)
);
```

Table Name: INSTRUCTORS (0%)

Column Name	Column Data Type	Null/Not Null	Primary Key
Instractor_Code	INT	NOT NULL	PRIMARY KEY
Instructor_First_Name	VARCHAR(32)	NOT NULL	
Instructor_Last_Name	VARCHAR(32)	NOT NULL	
Instructor_Area	VARCHAR(32)	NOT NULL	
Instructor_School	VARCHAR(32)	NOT NULL	
Instructor_email	VARCHAR(32)	NOT NULL	

```
CREATE TABLE IF NOT EXISTS INSTRUCTORS (
     Instractor_code          INT NOT NULL PRIMARY KEY,
     Instractor_First_Name    VARCHAR(32),
     Instractor_Last_Name     VARCHAR(32),
     Instractor_Area          VARCHAR(32),
     Instractor_School        VARCHAR(32),
     Student_email            VARCHAR(32)

);
```

Table Name: COURSES (2.5%)

Column Name	Column Data Type	Null/Not Null	Primary Key
Course_Code	INT	NOT NULL	PRIMARY KEY
Course_Name	VARCHAR(64)	NOT NULL	
Course_Offering	VARCHAR(16)	NOT NULL	
Instructor_Code	INT	NOT NULL	

```
CREATE TABLE IF NOT EXISTS COURSES (
     <COMPLETE THE CODE>
);
```

Table Name: GRADES (5%)

Column Name	Column Data Type	Null/Not Null	Primary Key
Student_ID	INT	NOT NULL	PRIMARY KEY
Course_Code	INT	NOT NULL	PRIMARY KEY
Course_Grade	FLOAT	NOT NULL	

```
CREATE TABLE IF NOT EXISTS COURSES (
     <COMPLETE THE CODE>
);
```

Task4: Altering tables (2.5%)

Now, you notice that you had a mistake in naming one of the columns in the INSTRUCTORS table. Instead of Instructor_email, you have Student_email. The command for altering a table is:

```
ALTER TABLE <COMPLETE THE CODE> CHANGE COLUMN <COMPLETE THE CODE> <COMPLETE THE CODE>
<COMPLETE THE CODE>
```

Task5: Insert values into the tables and update some data (0%)

Table Name: Students

Students_ID	Student_Birthdate	Student_First_Name	Student_Last_Name	Student_email	Student_Gender	Student_Citizenship
2673	2004-08-19	Chris	Adams	adamsc.mcmaster.ca	Male	Canada
2889	2003-12-24	Muhammad	Bakar	bakarm@mcmaster.ca	Male	Egypt
3108	2002-02-09	Yuki	Nakamura	nakamuray@mcmaster.ca	Female	Japan
3330	2001-06-02	Carlos	Mendoza	mendozac@mcmaster.ca	Male	Spain
3555	2000-05-06	Luca	Rossini	rossinil@mcmaster.ca	Male	Canada
3783	2002-07-01	Fatima	Khan	khanfa@mcmaster.ca	Female	Pakistan
4014	2001-09-02	Ayna	Ivanova	ivanovaa@mcmaster.ca	Female	Russia
4248	2002-05-17	Raj	Patel	patelra@mcmaster.ca	Male	India
4485	2001-03-08	Sofia	Garcia	garcias@mcmaster.ca	Female	Spain
4725	2001-02-03	Mei Ling	Zhang	zhangml@mcmaster.ca	Female	China
5648	2000-08-29	Andrew	Penn	Penna@mcmaster.ca	Male	Canada

```
INSERT INTO STUDENTS(Student_ID, Student_Birthdate, Student_First_Name, Student_Last_Name,
Student_email, Student_Gender, Student_Citizenship) VALUES
      (2673, '2004-08-19', 'Chris', 'Adams', 'adamsc.mcmaster.ca', 'Male', 'Canada'),
      (2889, '2003-12-24', 'Muhammad', 'Bakar', 'bakarm@mcmaster.ca', 'Male', 'Egypt'),
      (3108, '2002-02-09', 'Yuki', 'Nakamura', 'nakamuray@mcmaster.ca', 'Female', 'Japan'),
      (3330, '2001-06-02', 'Carlos', 'Mendoza', 'mendozac@mcmaster.ca', 'Male', 'Spain'),
      (3555, '2000-05-06', 'Luca', 'Rossini', 'rossinil@mcmaster.ca', 'Male', 'Canada'),
      (3783, '2002-07-01', 'Fatima', 'Khan', 'khanfa@mcmaster.ca', 'Female', 'Pakistan'),
      (4014, '2001-09-02', 'Ayna', 'Ivanova', 'ivanovaa@mcmaster.ca', 'Female', 'Russia'),
      (4248, '2002-05-17', 'Raj', 'Patel', 'patelra@mcmaster.ca', 'Male', 'India'),
      (4485, '2001-03-08', 'Sofia', 'Garcia', 'garcias@mcmaster.ca', 'Female', 'Spain'),
      (4725, '2001-02-03', 'Mei Ling', 'Zhang', 'zhangml@mcmaster.ca', 'Female', 'China'),
      (5648, '2000-08-29', 'Andrew', 'Penn', 'Penna@mcmaster.ca', 'Male', 'Canada')
```

Instructors

Instractor_code	Instructor_First_Name	Instructor_Last_Name	Instructor_Area	Instructor_School	Instructor_email
303	Aisha	Ahmed	Marketing	Business	ahmeda@mcmaster.ca
306	Johan	Verneulen	Information systems	Business	vermeulenj@mcmaster.ca
309	Emma	Li	Finance	Economy	Liem34@mcmaster.ca
312	Elena	Silva	Strategic Management	Business	silvae@mcmaster.ca

```
INSERT INTO INSTRUCTORS(Instructor_code, Instructor_First_Name, Instructor_Last_Name,
Instructor_Area, Instructor_School, Instructor_email) VALUES
          (303, 'Aisha', 'Ahmed', 'Marketing', 'Business', 'ahmeda@mcmaster.ca'),
          (306, 'Johan', 'Verneulen', 'Information systems', 'Business',
'vermeulenj@mcmaster.ca'),
          (309, 'Emma', 'Li', 'Finance', 'Economy', 'Liem34@mcmaster.ca'),
          (312, 'Elena', 'Silva', 'Strategic Management', 'Business', 'silvae@mcmaster.ca')
```

Courses

Course_Code	Course_Name	Course_Offering	Instructor_Code
10001	Human Resource Management	First Semester	303
10002	Operational Management	First Semester	303
10003	Business Analytics	First Semester	306
10004	Accounting	First Semester	309
10005	Financial Management	Second Semester	309
10006	Strategic Management	Second Semester	312

10007	Digital Transformation	Second Semester	306
10008	Data mining	Second Semester	306
10009	Business Consulting	Third Semester	312
10010	Negotiation	Third Semester	312
10011	Marketing Management	Third Semester	303
10012	Project Management	Third Semester	312
10013	Health Management	Fourth Semester	303
10014	Economics	Fourth Semester	309
10015	AI in Business	Fourth Semester	306

```
INSERT INTO COURSES(Course_Code, Course_Name, Course_Offering) VALUES
      (1, 'Human Resource Management', 'First Semester'),
      (2, 'Operational Management', 'First Semester'),
      (3, 'Business Analytics', 'First Semester'),
      (4, 'Accounting', 'First Semester'),
      (5, 'Financial Management', 'Second Semester'),
      (6, 'Strategic Management', 'Second Semester'),
      (7, 'Digital Transformation', 'Second Semester'),
      (8, 'Data mining', 'Second Semester'),
      (9, 'Business Consulting', 'Third Semester'),
      (10, 'Negotiation', 'Third Semester'),
      (11, 'Marketing Management', 'Third Semester'),
      (12, 'Project Management', 'Third Semester'),
      (13, 'Health Management', 'Fourth Semester'),
      (14, 'Economics', 'Fourth Semester'),
      (15, 'AI in Business', 'Fourth Semester')
```

Grades

Students_ID	Course_Code	Course_Grade
5648	10002	90.1
3783	10004	63.5
4248	10003	74.6
4014	10008	75.8
3330	10013	75.9

3555	10010	80.6
4014	10011	60.5
3783	10015	94.3
3783	10008	67.8
4725	10004	89.1
4725	10009	85.6
3783	10014	67.8
2889	10003	65.9
4485	10007	79.2
4248	10010	92.3
4725	10013	63.1
2673	10012	89.6
3783	10009	81.7
4725	10010	64.4
2889	10002	83.3
3330	10014	84.1
3330	10002	61.3
4014	10012	78.6
3555	10009	65.9
3108	10004	82
4248	10005	85.4
2889	10013	58.1
3555	10015	67.3
4014	10009	72.5
4725	10014	71.4
3108	10002	77.4
4014	10001	66.9
4485	10010	67.2
2673	10014	76.9
5648	10012	83.4
4248	10002	58.6

3783	10010	77.3
3108	10012	57.2
5648	10013	63.1
2673	10011	85.8
5648	10006	88.8
3108	10008	75.1
5648	10007	85
4725	10001	60.8
2673	10002	88.4
4248	10001	72.2
4248	10014	86.4
3330	10009	85.1
3108	10007	88
4485	10005	85.8
4485	10012	94.1
3330	10006	76.4
3108	10014	90.3
2673	10013	93.3
5648	10004	82.4
4014	10006	66.2
5648	10014	71.4
4485	10011	77.6
2889	10011	78.2
4725	10015	62.1
2889	10007	88.8
2673	10008	89
3555	10011	59.2
3555	10013	87.6

```
INSERT INTO GRADES(Student_ID, Course_Code, Course_Grade) VALUES
```

```
    (5648, 10002, 90.1),
    (3783, 10004, 63.5),
    (4248, 10003, 74.6),
    (4014, 10008, 75.8),
    (3330, 10013, 75.9),
    (3555, 10010, 80.6),
    (4014, 10011, 60.5),
    (3783, 10015, 94.3),
    (3783, 10008, 67.8),
    (4725, 10004, 89.1),
    (4725, 10009, 85.6),
    (3783, 10014, 67.8),
    (2889, 10003, 65.9),
    (4485, 10007, 79.2),
    (4248, 10010, 92.3),
    (4725, 10013, 63.1),
    (2673, 10012, 89.6),
    (3783, 10009, 81.7),
    (4725, 10010, 64.4),
    (2889, 10002, 83.3),
    (3330, 10014, 84.1),
    (3330, 10002, 61.3),
    (4014, 10012, 78.6),
    (3555, 10009, 65.9),
    (3108, 10004, 82),
    (4248, 10005, 85.4),
    (2889, 10013, 58.1),
    (3555, 10015, 67.3),
    (4014, 10009, 72.5),
    (4725, 10014, 71.4),
    (3108, 10002, 77.4),
    (4014, 10001, 66.9),
    (4485, 10010, 67.2),
    (2673, 10014, 76.9),
    (5648, 10012, 83.4),
    (4248, 10002, 58.6),
    (3783, 10010, 77.3),
    (3108, 10012, 57.2),
    (5648, 10013, 63.1),
    (2673, 10011, 85.8),
    (5648, 10006, 88.8),
    (3108, 10008, 75.1),
    (5648, 10007, 85),
    (4725, 10001, 60.8),
    (2673, 10002, 88.4),
    (4248, 10001, 72.2),
    (4248, 10014, 86.4),
    (3330, 10009, 85.1),
    (3108, 10007, 88),
    (4485, 10005, 85.8),
    (4485, 10012, 94.1),
    (3330, 10006, 76.4),
    (3108, 10014, 90.3),
    (2673, 10013, 93.3),
    (5648, 10004, 82.4),
    (4014, 10006, 66.2),
    (5648, 10014, 71.4),
    (4485, 10011, 77.6),
    (2889, 10011, 78.2),
    (4725, 10015, 62.1),
    (2889, 10007, 88.8),
    (2673, 10008, 89),
    (3555, 10011, 59.2),
    (3555, 10013, 87.6)
```

Task6: Develop the following queries (80%)

Task6_1) List the student name (first and last), birthdate, email, and gender of Canadian students (2%)

```
SELECT <COMPLETE THE CODE>
FROM STUDENTS
WHERE <COMPLETE THE CODE>
```

Task6_2) List the countries from which students are coming (3%)

```
SELECT <COMPLETE THE CODE> <COMPLETE THE CODE> FROM STUDENTS
```

Task6_3) Which courses (course code and course name) are offered in the second semester? (5%)

```
SELECT <COMPLETE THE CODE>
FROM COURSES
WHERE <COMPLETE THE CODE>
```

Task6_4) Which instructors (instructor first and last name and email) are teaching in the third semester? (7.5%)

```
SELECT <COMPLETE THE CODE>
FROM INSTRUCTORS I1
WHERE I1.<COMPLETE THE CODE> IN (SELECT C1.<COMPLETE THE CODE>
                                 FROM COURSES
                                 WHERE <COMPLETE THE CODE>)
```

Task6_5) Which students (Student first and last name and email) have been thought by instructor(s) from School of economy? (10%)

```
SELECT  <COMPLETE THE CODE> FROM STUDENTS S1
    WHERE S1.<COMPLETE THE CODE> IN (
        SELECT G1.<COMPLETE THE CODE> FROM GRADES G1
            WHERE G1.<COMPLETE THE CODE> IN (
                SELECT C1.<COMPLETE THE CODE> FROM COURSES C1
                    WHERE C1.<COMPLETE THE CODE> IN (
                        SELECT I1.<COMPLETE THE CODE> FROM Instructors I1
                            WHERE I1.<COMPLETE THE CODE> = "Economy"
                    )
            )
    )
```

Task6_6) Which students (Student first and last name and email) received grades greater than 90%? What grade did they receive? (10%)

```
SELECT
    (<COMPLETE THE CODE>) Student_First_Name,
    (<COMPLETE THE CODE>) Student_Last_Name,
    (<COMPLETE THE CODE>) Student_email,
    Course_Grade
FROM GRADES G1
WHERE <COMPLETE THE CODE>
```

Task6_7) Which students (Student first and last name and email) received grades between 75 and 85 in Project Management? What grades did they receive? (12.5%)

```
ELECT
    (<COMPLETE THE CODE>) Student_First_Name,
    (<COMPLETE THE CODE>) Student_Last_Name,
    (<COMPLETE THE CODE>) Student_email,
    Course_Grade
FROM GRADES G1
WHERE Course_Grade <COMPLETE THE CODE> AND Course_Code IN (<COMPLETE THE CODE>)
```

Task6_8) List courses (course code, course name, and average grade) in which the average grades were higher than 80. (10%)

```
SELECT
    course_Code,
    (<COMPLETE THE CODE>) Course_Name,
    <COMPLETE THE CODE> Average_Grade
FROM GRADES G1
GROUP BY course_Code <COMPLETE THE CODE> AVG(Course_Grade)>80
```

Task6_9) What are the average grades of Male and Female students in all courses? (10%)

```
SELECT
     <COMPLETE THE CODE> Student_Gender,
     AVG(Course_Grade)
FROM GRADES G1
GROUP BY <COMPLETE THE CODE>
```

Task6_10) What are the average grades of different instructors? (10%)

```
<COMPLETE THE CODE>
```