1. SQL to create three tables:

```sql
CREATE TABLE Students
(   studentId INT AUTO_INCREMENT,
    stName VARCHAR(30) NOT NULL,
    email VARCHAR(40),
    gpa FLOAT DEFAULT 0.0,
    PRIMARY KEY (studentId),
    CONSTRAINT CHECK_GPA
    CHECK (gpa BETWEEN 0 AND 4.3)
);

CREATE TABLE Courses
    ( courseId INT AUTO_INCREMENT,
    courseNumber VARCHAR(10) NOT NULL,
    courseName VARCHAR(50) NOT NULL,
    courseDescription VARCHAR(200),
    creditHours INT DEFAULT 3,
    PRIMARY KEY (courseId),
    CONSTRAINT CHECK_CREDIT_HOUR
    CHECK (creditHours BETWEEN 0 AND 6)
);

CREATE TABLE Enrollments
    ( studentId INT,
    courseId INT,
    letterGrade CHAR(2),
    PRIMARY KEY (studentId, courseId),
    FOREIGN KEY (studentId)
    REFERENCES Students(studentId)
    ON DELETE NO ACTION
    ON UPDATE CASCADE,
    FOREIGN KEY (courseId)
    REFERENCES Courses(courseId)
    ON DELETE NO ACTION
    ON UPDATE CASCADE
);
```

2. Create Students table:

```
MariaDB [ywang92]> CREATE TABLE Students
    -> (    studentId INT AUTO_INCREMENT,
    ->      stName VARCHAR(30) NOT NULL,
    ->      email VARCHAR(40),
    ->      gpa FLOAT DEFAULT 0.0,
    ->      PRIMARY KEY (studentId),
    ->      CONSTRAINT CHECK_GPA
    ->      CHECK (gpa BETWEEN 0 AND 4.3)
    -> );
Query OK, 0 rows affected (0.01 sec)
```

3.  Create Courses table:

```
MariaDB [ywang92]> CREATE TABLE Courses
    ->      ( courseId INT AUTO_INCREMENT,
    ->      courseNumber VARCHAR(10) NOT NULL,
    ->      courseName VARCHAR(50) NOT NULL,
    ->      courseDescription VARCHAR(200),
    ->      creditHours INT DEFAULT 3,
    ->      PRIMARY KEY (courseId),
    ->      CONSTRAINT CHECK_CREDIT_HOUR
    ->      CHECK (creditHours BETWEEN 0 AND 6)
    -> );
Query OK, 0 rows affected (0.01 sec)
```

4.  Create Enrollments table:

```
MariaDB [ywang92]> CREATE TABLE Enrollments
    ->      ( studentId INT,
    ->      courseId INT,
    ->      letterGrade CHAR(2),
    ->      PRIMARY KEY (studentId, courseId),
    ->      FOREIGN KEY (studentId)
    ->      REFERENCES Students(studentId)
    ->      ON DELETE NO ACTION
    ->      ON UPDATE CASCADE,
    ->      FOREIGN KEY (courseId)
    ->      REFERENCES Courses(courseId)
    ->      ON DELETE NO ACTION
    ->      ON UPDATE CASCADE
    -> );
Query OK, 0 rows affected (0.00 sec)
```

5.  Test Students table
    a.  test student gpa constraint:
    ```
    INSERT INTO Students (stName, email, gpa)
    VALUE ('hui', '456@unb.ca', 5.0);
    ```

```
MariaDB [ywang92]> INSERT INTO Students (stName, email, gpa)
    -> VALUE ('hui', '456@unb.ca', 5.0);
Query OK, 1 row affected (0.02 sec)

MariaDB [ywang92]> select * from Students;
+-----------+--------+------------+------+
| studentId | stName | email      | gpa  |
+-----------+--------+------------+------+
|         1 | hui    | 456@unb.ca |    5 |
+-----------+--------+------------+------+
1 row in set (0.00 sec)
```

b. test student not null constraint:

INSERT INTO Students (stName, email, gpa)

VALUE (NULL, '456@unb.ca', 2.0);

```
MariaDB [ywang92]> INSERT INTO Students (stName, email, gpa)
    -> VALUE (NULL, '456@unb.ca', 2.0);
ERROR 1048 (23000): Column 'stName' cannot be null
```

6. Test Courses table:

a. test creditHours constraint:

INSERT INTO Courses (courseNumber, courseName, creditHours, courseDescription)

VALUE ('CS1111', 'INTRO TO Something', NULL , 'intro to something description');

INSERT INTO Courses (courseNumber, courseName, creditHours, courseDescription)

VALUE ('CS1111', 'INTRO TO Something', 8 , 'intro to something description');

```
MariaDB [ywang92]> INSERT INTO Courses (courseNumber, courseName, creditHours, courseDescription)
    -> VALUE ('CS1111', 'INTRO TO Something', NULL , 'intro to something description');
Query OK, 1 row affected (0.00 sec)

MariaDB [ywang92]> INSERT INTO Courses (courseNumber, courseName, creditHours, courseDescription)
    -> VALUE ('CS1111', 'INTRO TO Something', 8 , 'intro to something description');
Query OK, 1 row affected (0.01 sec)
```

b. test course not null constraint:

INSERT INTO Courses (courseNumber, courseName, courseDescription)

VALUE (NULL, 'INTRO TO Something', 'intro to something description');

INSERT INTO Courses (courseNumber, courseName, courseDescription)

VALUE ('something', NULL, 'intro to something description');

```
MariaDB [ywang92]> INSERT INTO Courses (courseNumber, courseName, courseDescription)
    -> VALUE (NULL, 'INTRO TO Something', 'intro to something description');
ERROR 1048 (23000): Column 'courseNumber' cannot be null
```

```
MariaDB [ywang92]> INSERT INTO Courses (courseNumber, courseName, courseDescription)
    -> VALUE ('something', NULL, 'intro to something description');
ERROR 1048 (23000): Column 'courseName' cannot be null
```

7. Add an approvedDate attribute to the Course table:

ALTER TABLE Courses ADD approvedDate DATE;

```
MariaDB [ywang92]> ALTER TABLE Courses ADD approvedDate DATE;
Query OK, 3 rows affected (0.00 sec)
Records: 3  Duplicates: 0  Warnings: 0
```

8. Use Insert (or Update) statements to add (or update) data to the table with the extra attribute:

INSERT INTO Courses (courseNumber, courseName, creditHours,

courseDescription, approvedDate)

VALUE ('CS1110', 'Java 23', 6, 'java course 23', '20210312');


UPDATE Courses

SET approvedDate = '20210520'

WHERE courseId = 2;

```
MariaDB [ywang92]> INSERT INTO Courses (courseNumber, courseName, creditHours, courseDescription, approvedDate)
    -> VALUE ('CS1110', 'Java 23', 6, 'java course 23', '20210312');
Query OK, 1 row affected (0.00 sec)
```

```
MariaDB [ywang92]> UPDATE Courses
    -> SET approvedDate = '20210520'
    -> WHERE courseId = 2;
Query OK, 1 row affected (0.00 sec)
Rows matched: 1  Changed: 1  Warnings: 0
```

```
MariaDB [ywang92]> select * from Courses;
+----------+--------------+-------------------+-------------------------------+-------------+--------------+
| courseId | courseNumber | courseName        | courseDescription             | creditHours | approvedDate |
+----------+--------------+-------------------+-------------------------------+-------------+--------------+
|        1 | CS1111       | INTRO TO Something | intro to something description |        NULL | NULL         |
|        2 | CS1111       | INTRO TO Something | intro to something description |        NULL | 2021-05-20   |
|        3 | CS1111       | INTRO TO Something | intro to something description |           8 | NULL         |
|        4 | CS1110       | Java 23           | java course 23                |           6 | 2021-03-12   |
+----------+--------------+-------------------+-------------------------------+-------------+--------------+
4 rows in set (0.00 sec)
```

9. test deleting student that has enrolled in a course

DELETE FROM Students

WHERE studentId = 1;

```
MariaDB [ywang92]> DELETE FROM Students
    -> WHERE studentId = 1;
ERROR 1451 (23000): Cannot delete or update a parent row: a foreign key constraint fails (`ywang92`.
` (`studentId`) ON DELETE NO ACTION ON UPDATE CASCADE)
```

10. for each student lists the information for courses they've taken and their letter grade

select * from Courses;


select * from Students;

```sql
select * from Enrollments;


SELECT *
FROM Students AS A
LEFT JOIN Enrollments AS B ON A.studentId = B.studentId
LEFT JOIN Courses AS C ON B.courseId = C.courseId;
```

```
MariaDB [ywang92]> select * from Courses;
+----------+--------------+------------------+------------------------------+-------------+--------------+
| courseId | courseNumber | courseName       | courseDescription            | creditHours | approvedDate |
+----------+--------------+------------------+------------------------------+-------------+--------------+
|        1 | CS1111       | INTRO TO Something | intro to something description |        NULL | NULL         |
|        2 | CS1111       | INTRO TO Something | intro to something description |        NULL | 2021-05-20   |
|        3 | CS1111       | INTRO TO Something | intro to something description |           8 | NULL         |
|        4 | CS1110       | Java 23          | java course 23               |           6 | 2021-03-12   |
+----------+--------------+------------------+------------------------------+-------------+--------------+
4 rows in set (0.00 sec)
```

```
MariaDB [ywang92]> select * from Students;
+-----------+-------------+-------------+-----+
| studentId | stName      | email       | gpa |
+-----------+-------------+-------------+-----+
|         1 | hui         | 456@unb.ca  |   5 |
|         2 | yulong wang | 123@unb.ca  |   4 |
|         3 | max         | 456@unb.ca  |   4 |
|         4 | hui         | 456@unb.ca  |   5 |
+-----------+-------------+-------------+-----+
4 rows in set (0.00 sec)
```

```
MariaDB [ywang92]> select * from Enrollments;
+-----------+----------+-------------+
| studentId | courseId | letterGrade |
+-----------+----------+-------------+
|         1 |        1 | B           |
|         1 |        2 | A           |
|         2 |        1 | A           |
|         2 |        3 | A           |
+-----------+----------+-------------+
4 rows in set (0.00 sec)
```

```
MariaDB [ywang92]> SELECT *
    -> FROM Students AS A
    -> LEFT JOIN Enrollments AS B ON A.studentId = B.studentId
    -> LEFT JOIN Courses AS C ON B.courseId = C.courseId;
+-----------+-------------+------------+-----+-----------+----------+-------------+----------+--------------+------------------+------------------------------+-------------+--------------+
| studentId | stName      | email      | gpa | studentId | courseId | letterGrade | courseId | courseNumber | courseName       | courseDescription            | creditHours | approvedDate |
+-----------+-------------+------------+-----+-----------+----------+-------------+----------+--------------+------------------+------------------------------+-------------+--------------+
|         1 | hui         | 456@unb.ca |   5 |         1 |        1 | B           |        1 | CS1111       | INTRO TO Something | intro to something description |        NULL | NULL         |
|         1 | hui         | 456@unb.ca |   5 |         1 |        2 | A           |        2 | CS1111       | INTRO TO Something | intro to something description |        NULL | 2021-05-20   |
|         2 | yulong wang | 123@unb.ca |   4 |         2 |        1 | A           |        1 | CS1111       | INTRO TO Something | intro to something description |        NULL | NULL         |
|         2 | yulong wang | 123@unb.ca |   4 |         2 |        3 | A           |        3 | CS1111       | INTRO TO Something | intro to something description |           8 | NULL         |
|         3 | max         | 456@unb.ca |   4 |      NULL |     NULL | NULL        |     NULL | NULL         | NULL             | NULL                         |        NULL | NULL         |
|         4 | hui         | 456@unb.ca |   5 |      NULL |     NULL | NULL        |     NULL | NULL         | NULL             | NULL                         |        NULL | NULL         |
+-----------+-------------+------------+-----+-----------+----------+-------------+----------+--------------+------------------+------------------------------+-------------+--------------+
6 rows in set (0.00 sec)
```