Q2. Supply suitable CREATE TABLE statements to implement the diagram you in Q1. Care should be taken to include the necessary foreign key constraints t the various relationship types in your above diagram.

For each table you create, both the SQL statement(s) and a screenshot of the creation should be supplied (showing any foreign key constraints).

The following screenshots summarize my creation of tables, and some exampl inserted values into them for illustrative purposes. Please note that foreign key denoted as 'MUL' in the description of tables, which can be clarified by the M documentation:
"If `Key` is `MUL`, the column is the first column of a nonunique index in which occurrences of a given value are permitted within the column."

```
mysql> DROP DATABASE IF EXISTS UniversityTimetable_DB;
Query OK, 0 rows affected, 1 warning (0.00 sec)
```

```
mysql> DROP DATABASE IF EXISTS UniversityTimetableDB;
Query OK, 8 rows affected (0.05 sec)
```

```
mysql> CREATE DATABASE UniversityTimetableDB;
Query OK, 1 row affected (0.00 sec)
```

```
mysql> USE UniversityTimetableDB;
Database changed
```

```
mysql> DROP TABLE IF EXISTS `Program`;
Query OK, 0 rows affected, 1 warning (0.00 sec)
```

```
mysql> CREATE TABLE `Program` (
    ->   `program_id` VARCHAR(8) NOT NULL PRIMARY KEY,
    ->   `name` VARCHAR(10) NOT NULL,
    ->   `department` VARCHAR(8) NOT NULL
    ->
    -> );
Query OK, 0 rows affected (0.24 sec)
```

```
mysql> DROP TABLE IF EXISTS `Lecturer`;
Query OK, 0 rows affected, 1 warning (0.00 sec)
```

```
mysql> CREATE TABLE `Lecturer` (
    ->   `lecturer_id` INT(8) NOT NULL PRIMARY KEY,
    ->   `lec_name` VARCHAR(10) NOT NULL,
    ->   `office_number` VARCHAR(8) NOT NULL,
    ->   `dept` VARCHAR(10) NOT NULL,
    ->   `email`VARCHAR(20)NOT NULL
    ->
    -> );
Query OK, 0 rows affected (0.12 sec)
```

```
mysql> DROP TABLE IF EXISTS `Student`;
Query OK, 0 rows affected, 1 warning (0.00 sec)
```

```
mysql> CREATE TABLE `Student` (
    ->   `student_id` INT(8) NOT NULL PRIMARY KEY,
    ->   `name` VARCHAR(20) NOT NULL,
    ->   `date_of_birth` DATE NOT NULL,
    ->   `program_id` VARCHAR(8) NOT NULL,
    ->   `date_registered`DATETIME NOT NULL,
    ->   FOREIGN KEY (program_id) REFERENCES Program(program_id)
    ->
    -> );
Query OK, 0 rows affected (0.12 sec)
```

```
mysql> DROP TABLE IF EXISTS `Tutor`;
Query OK, 0 rows affected, 1 warning (0.00 sec)
```

```
mysql> CREATE TABLE `Tutor` (
    ->   `tutor_id` INT(8) NOT NULL PRIMARY KEY,
    ->   `name` VARCHAR(20) NOT NULL,
    ->   `program_id` VARCHAR(8) NOT NULL,
    ->   FOREIGN KEY (program_id) REFERENCES Program(program_id)
    ->
    -> );
Query OK, 0 rows affected (0.07 sec)
```

```
mysql> DROP TABLE IF EXISTS `Modules`;
Query OK, 0 rows affected, 1 warning (0.00 sec)
```

```
mysql> CREATE TABLE `Modules` (
    ->   `module_code` VARCHAR(8) NOT NULL PRIMARY KEY,
    ->   `mod_name` VARCHAR(20) NOT NULL,
    ->   `lecturer_id` INT(8) NOT NULL,
    ->   FOREIGN KEY (lecturer_id) REFERENCES Lecturer(lecturer_id)
    ->
    -> );
Query OK, 0 rows affected (0.09 sec)
```

```
mysql> DROP TABLE IF EXISTS `Lecture`;
Query OK, 0 rows affected, 1 warning (0.00 sec)
```

```
mysql> CREATE TABLE `Lecture` (
    ->   `lecture_id` INT(8) NOT NULL PRIMARY KEY,
    ->   `room` VARCHAR(8) NOT NULL,
    ->   `date` DATE NOT NULL,
    ->   `time` TIME NOT NULL,
    ->   `lecturer_id`INT(8)NOT NULL,
    ->   FOREIGN KEY (lecturer_id) REFERENCES Lecturer(lecturer_id)
    ->
    -> );
Query OK, 0 rows affected (0.05 sec)
```

*Error: Lecture tables no longer includes date as a separate attribute and should be contained in column ‘time’ where DATETIME is the type. See here:

```
mysql> ALTER TABLE Lecture CHANGE time time DATETIME NOT NULL;
Query OK, 1 row affected (0.19 sec)
Records: 1  Duplicates: 0  Warnings: 0

mysql> DESCRIBE Lecture;
+-------------+------------+------+-----+---------+-------+
| Field       | Type       | Null | Key | Default | Extra |
+-------------+------------+------+-----+---------+-------+
| lecture_id  | int(8)     | NO   | PRI | NULL    |       |
| room        | varchar(8) | NO   |     | NULL    |       |
| date        | date       | NO   |     | NULL    |       |
| time        | datetime   | NO   |     | NULL    |       |
| lecturer_id | int(8)     | NO   | MUL | NULL    |       |
+-------------+------------+------+-----+---------+-------+
5 rows in set (0.00 sec)

mysql> ALTER TABLE Lecture DROP COLUMN date;
Query OK, 1 row affected (0.17 sec)
Records: 1  Duplicates: 0  Warnings: 0
```

```
mysql> DROP TABLE IF EXISTS `ProgramModules`;
Query OK, 0 rows affected, 1 warning (0.00 sec)
```

```
mysql> CREATE TABLE `ProgramModules` (
    -> `program_id` VARCHAR(8)NOT NULL,
    -> `module_code`VARCHAR(8)NOT NULL,
    -> FOREIGN KEY (program_id) REFERENCES Program(program_id),
    -> FOREIGN KEY (module_code) REFERENCES Modules(module_code),
    -> PRIMARY KEY(program_id, module_code)
    -> );
Query OK, 0 rows affected (0.06 sec)
```

```
mysql> DROP TABLE IF EXISTS `ModulesLectures`;
Query OK, 0 rows affected, 1 warning (0.00 sec)
```

```
mysql> CREATE TABLE `ModulesLectures` (
    -> `module_code`VARCHAR(8)NOT NULL,
    -> `lecture_id`INT(8)NOT NULL,
    -> FOREIGN KEY (module_code) REFERENCES Modules(module_code),
    -> FOREIGN KEY (lecture_id) REFERENCES Lecture(lecture_id),
    -> PRIMARY KEY(lecture_id, module_code)
    -> );
Query OK, 0 rows affected (0.05 sec)
```

```
mysql> EXPLAIN Program;
+------------+-------------+------+-----+---------+-------+
| Field      | Type        | Null | Key | Default | Extra |
+------------+-------------+------+-----+---------+-------+
| program_id | varchar(8)  | NO   | PRI | NULL    |       |
| name       | varchar(10) | NO   |     | NULL    |       |
| department | varchar(8)  | NO   |     | NULL    |       |
+------------+-------------+------+-----+---------+-------+
3 rows in set (0.02 sec)
```

```
mysql> DESCRIBE Lecturer;
+---------------+-------------+------+-----+---------+-------+
| Field         | Type        | Null | Key | Default | Extra |
+---------------+-------------+------+-----+---------+-------+
| lecturer_id   | int(8)      | NO   | PRI | NULL    |       |
| lec_name      | varchar(10) | NO   |     | NULL    |       |
| office_number | varchar(8)  | NO   |     | NULL    |       |
| dept          | varchar(10) | NO   |     | NULL    |       |
| email         | varchar(20) | NO   |     | NULL    |       |
+---------------+-------------+------+-----+---------+-------+
5 rows in set (0.00 sec)
```

```
mysql> DESCRIBE Student;
+-----------------+-------------+------+-----+---------+-------+
| Field           | Type        | Null | Key | Default | Extra |
+-----------------+-------------+------+-----+---------+-------+
| student_id      | int(8)      | NO   | PRI | NULL    |       |
| name            | varchar(20) | NO   |     | NULL    |       |
| date_of_birth   | date        | NO   |     | NULL    |       |
| program_id      | varchar(8)  | NO   | MUL | NULL    |       |
| date_registered | datetime    | NO   |     | NULL    |       |
+-----------------+-------------+------+-----+---------+-------+
5 rows in set (0.00 sec)
```

```
mysql> DESCRIBE Tutor;
+------------+-------------+------+-----+---------+-------+
| Field      | Type        | Null | Key | Default | Extra |
+------------+-------------+------+-----+---------+-------+
| tutor_id   | int(8)      | NO   | PRI | NULL    |       |
| name       | varchar(20) | NO   |     | NULL    |       |
| program_id | varchar(8)  | NO   | MUL | NULL    |       |
+------------+-------------+------+-----+---------+-------+
3 rows in set (0.01 sec)
```

```
mysql> DESCRIBE Modules;
+-------------+-------------+------+-----+---------+-------+
| Field       | Type        | Null | Key | Default | Extra |
+-------------+-------------+------+-----+---------+-------+
| module_code | varchar(8)  | NO   | PRI | NULL    |       |
| mod_name    | varchar(20) | NO   |     | NULL    |       |
| lecturer_id | int(8)      | NO   | MUL | NULL    |       |
+-------------+-------------+------+-----+---------+-------+
3 rows in set (0.00 sec)
```

```
mysql> DESCRIBE Lecture;
+-------------+------------+------+-----+---------+-------+
| Field       | Type       | Null | Key | Default | Extra |
+-------------+------------+------+-----+---------+-------+
| lecture_id  | int(8)     | NO   | PRI | NULL    |       |
| room        | varchar(8) | NO   |     | NULL    |       |
| time        | datetime   | NO   |     | NULL    |       |
| lecturer_id | int(8)     | NO   | MUL | NULL    |       |
+-------------+------------+------+-----+---------+-------+
4 rows in set (0.01 sec)
```

```
mysql> DESCRIBE ProgramModules;
+-------------+------------+------+-----+---------+-------+
| Field       | Type       | Null | Key | Default | Extra |
+-------------+------------+------+-----+---------+-------+
| program_id  | varchar(8) | NO   | PRI | NULL    |       |
| module_code | varchar(8) | NO   | PRI | NULL    |       |
+-------------+------------+------+-----+---------+-------+
2 rows in set (0.01 sec)
```

```
mysql> DESCRIBE ModulesLectures;
+-------------+------------+------+-----+---------+-------+
| Field       | Type       | Null | Key | Default | Extra |
+-------------+------------+------+-----+---------+-------+
| module_code | varchar(8) | NO   | PRI | NULL    |       |
| lecture_id  | int(8)     | NO   | PRI | NULL    |       |
+-------------+------------+------+-----+---------+-------+
2 rows in set (0.00 sec)
```

```
mysql> ALTER TABLE Program CHANGE name name VARCHAR(25) NOT NULL;
Query OK, 1 row affected (0.12 sec)
Records: 1  Duplicates: 0  Warnings: 0
```

```
mysql> INSERT INTO Program VALUES ("CS101", "Computer Science BSc", "CSI");
Query OK, 1 row affected (0.00 sec)
```

```
mysql> SELECT * FROM Program;
+------------+----------------------+-------------+
| program_id | name                 | department  |
+------------+----------------------+-------------+
| AR666      | Sociology & French   | Humanities  |
| CS101      | Computer Science BSc | CSI         |
| EN899      | Civil Engineering    | Engineering |
| PS345      | Applied Psychology   | Psychology  |
+------------+----------------------+-------------+
4 rows in set (0.00 sec)
```

```
mysql> SELECT * FROM Lecturer;
+-------------+---------------+---------------+------------+----------------+
| lecturer_id | name          | office_number | dept       | email          |
+-------------+---------------+---------------+------------+----------------+
|         123 | Robert Morris | 301A          | Psychology | rmorris@ucd.ie |
|         124 | Rhona Wilson  | 508T          | CSI        | rwilson@ucd.ie |
|         125 | Mary Fahy     | 322F          | Engineerin | mfahy@ucd.ie   |
+-------------+---------------+---------------+------------+----------------+
3 rows in set (0.00 sec)
```

```
mysql> INSERT INTO Student VALUES ("14942312", "Terrence Stokes", "1990-08-23", "CS101"
, "2013-08-22 13:23:34");
Query OK, 1 row affected (0.00 sec)

mysql> SELECT * FROM Student;
+------------+-----------------+---------------+------------+---------------------+
| student_id | name            | date_of_birth | program_id | date_registered     |
+------------+-----------------+---------------+------------+---------------------+
|   14942312 | Terrence Stokes | 1990-08-23    | CS101      | 2013-08-22 13:23:34 |
+------------+-----------------+---------------+------------+---------------------+
1 row in set (0.00 sec)
```

```
mysql> INSERT INTO Tutor VALUES ("15556893", "Chri Mickhov", "AR666");
Query OK, 1 row affected (0.02 sec)

mysql> SELECT * FROM Tutor;
+----------+--------------+------------+
| tutor_id | name         | program_id |
+----------+--------------+------------+
| 15556893 | Chri Mickhov | AR666      |
+----------+--------------+------------+
1 row in set (0.00 sec)
```

```
mysql> INSERT INTO Modules VALUES ("COMP30510", "SQL Programming", "124");
Query OK, 1 row affected, 1 warning (0.00 sec)

mysql> SELECT * FROM Modules;
+-------------+-----------------+-------------+
| module_code | mod_name        | lecturer_id |
+-------------+-----------------+-------------+
| COMP3051    | SQL Programming |         124 |
+-------------+-----------------+-------------+
1 row in set (0.00 sec)
```

```
mysql> INSERT INTO Lecture VALUES (101, "305J","2014-02-17 14:00:00", 123);
Query OK, 1 row affected (0.00 sec)

mysql> select * from Lecture;
+------------+------+---------------------+-------------+
| lecture_id | room | time                | lecturer_id |
+------------+------+---------------------+-------------+
|        101 | 305J | 2014-02-17 14:00:00 |         123 |
+------------+------+---------------------+-------------+
1 row in set (0.00 sec)
```