Ben Brandhorst
SDEV 300 6380
Building Secure Web Applications
Professor Craig Poma
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Introduction to MySQL

1. Create a table named Faculty to store EMPLID, first name, last name, email, and year of birth, and Hire date. You should select the appropriate data types, sizes and constraints for the table. Hint: All tables need a Primary key.

```
mysql> tee ./mysql_tee.out
Logging to file './mysql_tee.out'
mysql> CREATE TABLE Faculty(
    -> EMPLID INT primary key,
    -> FirstName VARCHAR(20),
    -> LastName VARCHAR(20),
    -> Email VARCHAR(50),
    -> BirthYear YEAR,
    -> HireDate DATE
    -> );
Query OK, 0 rows affected (0.11 sec)

mysql> show tables;
+--------------------+
| Tables_in_sdev300 |
+--------------------+
| faculty            |
+--------------------+
1 row in set (0.00 sec)
```

2. Create a table named Courses to store CourseID, discipline name (e.g. SDEV), course number (e.g. 300), number of credits (e.g. 3), date first offered (e.g. June 10, 2010) and course title. You should select the appropriate data types, sizes and constraints for the table.

```
mysql> CREATE TABLE Courses(
    -> CourseID INT primary key,
    -> DiscName VARCHAR(6),
    -> CourseNum INT,
    -> NumCredits INT,
    -> FirstOffered DATE,
    -> CourseTitle VARCHAR(75)
    -> );
Query OK, 0 rows affected (0.06 sec)

mysql> show tables;
+--------------------+
| Tables_in_sdev300 |
+--------------------+
| courses            |
| faculty            |
+--------------------+
2 rows in set (0.00 sec)

mysql>
```

3. Create a table named FacultyCourses to store the Faculty and the Courses they have taught. You should design the table based on the Faculty and Courses tables you previously created. (Hint: Use Primary and Foreign key relationships).

```
mysql> CREATE TABLE FacultyCourses(
    -> FacultyCourseID INT primary key,
    -> EMPLID INT,
    -> CourseID INT,
    -> Foreign Key (EMPLID) references Faculty(EMPLID),
    -> Foreign Key (CourseID) references Courses(CourseID)
    -> );
Query OK, 0 rows affected (0.05 sec)

mysql> show tables;
+------------------+
| Tables_in_sdev300 |
+------------------+
| courses          |
| faculty          |
| facultycourses   |
+------------------+
3 rows in set (0.00 sec)

mysql>
```

4. Create Insert statements to populate at least 20 faculty records, 20 Course records, and 25 FacultyCourses records.

Faculty Records:

```
mysql> INSERT INTO Faculty(EMPLID, FirstName, LastName, Email, BirthYear, HireDate)
    -> VALUES('1','Tomeka','Hilder','t.hilder@gmail.com','1981','2018-01-01'),
    -> ('2','Yuriko','Larrabee','y.larrabee@gmail.com','1990','2015-01-02'),
    -> ('3','Jeanetta','Hyneman','j.hyneman@gmail.com','1959','2010-04-02'),
    -> ('4','John','Smith','j.smith@gmail.com','1967','2001-04-10'),
    -> ('5','Chris','Sheppard','c.sheppard@gmail.com','1985','2005-09-12'),
    -> ('6','John','Jacobs','j.jacobs@gmail.com','1999','2019-06-01'),
    -> ('7','Sarah','Conner','s.conner@gmail.com','1960','1994-02-01'),
    -> ('8','Julia','Macgregor','j.macgregor@gmail.com','1998','2019-05-14'),
    -> ('9','Zach','Brown','z.brown@gmail.com','1959','1999-11-04'),
    -> ('10','Leo','Davinci','l.davinci@gmail.com','1990','2010-08-24'),
    -> ('11','Uncle','Sam','u.sam@gmail.com','1975','2000-07-04'),
    -> ('12','Tom','Hanks','t.hanks@gmail.com','1961','2013-08-13'),
    -> ('13','Kim','Possible','k.possible@gmail.com','2000','2019-06-04'),
    -> ('14','Dora','Explorer','d.explorer@gmail.com','1986','2013-12-07'),
    -> ('15','Ben','Stiller','b.stiller@gmail.com','1976','1999-10-31'),
    -> ('16','Matt','Damon','m.damon@gmail.com','1988','2005-02-28'),
    -> ('17','Christian','Slater','c.slater@gmail.com','1989','2016-05-05'),
    -> ('18','Julie','Hemmingway','j.hemmingway@gmail.com','1995','2008-11-23'),
    -> ('19','Shaynia','Twain','s.twain@gmail.com','1976','1994-01-24'),
    -> ('20','Adam','Apple','a.apple@gmail.com','1996','2013-05-25');
Query OK, 20 rows affected (0.03 sec)
Records: 20  Duplicates: 0  Warnings: 0

mysql>
```

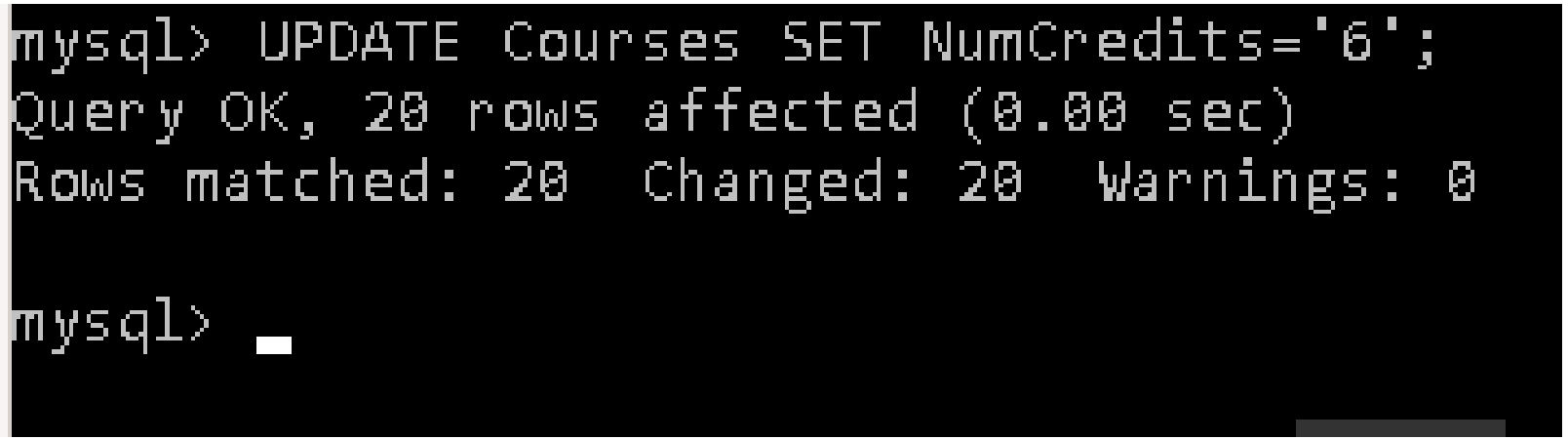
Courses Records:

```
mysql> INSERT INTO Courses(CourseID, DiscName, CourseNum, NumCredits, FirstOffered, CourseTitle)
    -> VALUES('1','CMIS','102','3','2015-06-01','Intro Problem Solving Alg Design'),
    -> ('2','CMIS','141','3','2013-06-01','Introductory Programming'),
    -> ('3','CMIS','242','3','2013-06-01','Intermediate Programming'),
    -> ('4','CMIS','320','3','2014-06-01','Relational Database Concepts & Applications'),
    -> ('5','HIST','156','3','2000-06-01','History of the United States to 1865'),
    -> ('6','IFSM','201','3','2005-06-01','Concepts and Applications of Information Technology'),
    -> ('7','LIBS','150','1','1999-06-01','Introduction to Research'),
    -> ('8','NUTR','100','3','2003-06-01','Elements of Nutrition'),
    -> ('9','WRTG','111','3','2000-06-01','Intro to Academic Writing I'),
    -> ('10','WRTG','112','3','2001-06-01','Intro to Academic Writing II'),
    -> ('11','HIST','125','3','2007-06-01','Technological Transformations'),
    -> ('12','SDEV','300','3','2014-06-01','Building Secure Web Applications'),
    -> ('13','BIOL','103','4','2007-06-01','Introduction to Biology'),
    -> ('14','SDEV','325','3','2016-06-01','Detecting Software Vulnerabilities'),
    -> ('15','GVPT','170','3','2004-06-01','American Government'),
    -> ('16','SDEV','250','3','2016-06-01','Database Security'),
    -> ('17','SDEV','360','3','2001-06-01','Secure Software Engineering'),
    -> ('18','WRTG','391','3','2016-06-01','Advanced Research Writing'),
    -> ('19','SDEV','400','3','2002-06-01','Secure Programming in the Cloud'),
    -> ('20','SDEV','460','3','2018-06-01','Software Security Testing');
Query OK, 20 rows affected (0.00 sec)
Records: 20  Duplicates: 0  Warnings: 0

mysql>
```

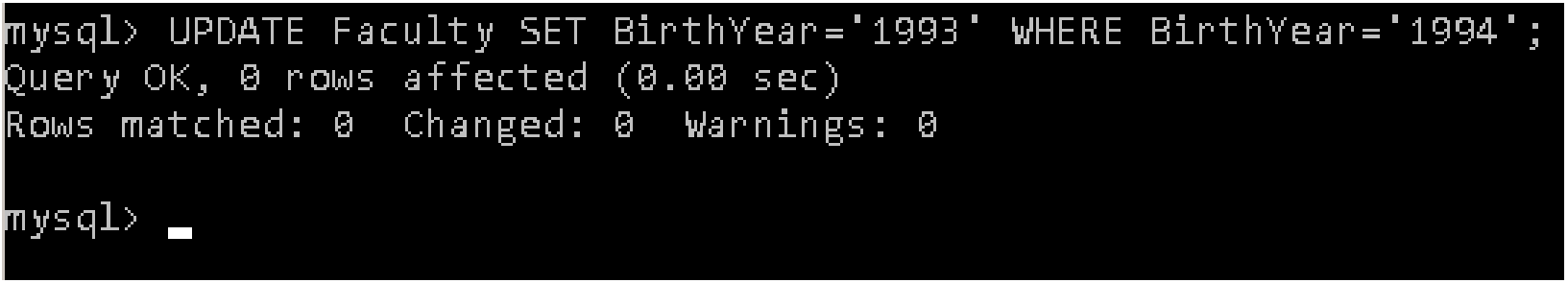
FacultyCourses Records:

```
mysql> INSERT INTO FacultyCourses(FacultyCourseID,EMPLID,CourseID)
    -> VALUES('1','20','1'),
    -> ('2','19','5'),
    -> ('3','18','6'),
    -> ('4','17','7'),
    -> ('5','16','8'),
    -> ('6','15','9'),
    -> ('7','14','10'),
    -> ('8','13','11'),
    -> ('9','12','12'),
    -> ('10','11','13'),
    -> ('11','10','14'),
    -> ('12','9','15'),
    -> ('13','8','16'),
    -> ('14','7','17'),
    -> ('15','6','18'),
    -> ('16','5','19'),
    -> ('17','4','20'),
    -> ('18','3','8'),
    -> ('19','2','7'),
    -> ('20','1','6'),
    -> ('21','10','5'),
    -> ('22','11','4'),
    -> ('23','12','1'),
    -> ('24','13','2'),
    -> ('25','14','3');
Query OK, 25 rows affected (0.00 sec)
Records: 25  Duplicates: 0  Warnings: 0

mysql>
```

5. Create an update statement to update all Courses to 6 credits.



6. Create an update statement to update any Faculty with a year of birth of 1994 to change it to 1993.



7. Write an appropriate SQL statement to delete any Faculty record whose Last name starts with the letter ‘R’ or the letter ‘S’. (Hint: this should only be one SQL statement not two.)

```
mysql> DELETE FROM Faculty WHERE LastName LIKE 'r%' OR LastName LIKE 's%';
ERROR 1451 (23000): Cannot delete or update a parent row: a foreign key constraint fails (`sdev300`.`facultycourses`, CONSTRAINT `facultycourses_ibfk_1` FOREIGN KEY (`EMPLID`) REFERENCES `faculty` (`EMPLID`))
mysql>
```

8. Write an appropriate SQL statement to delete any Course record that was first offered in 2004.

```
mysql> DELETE FROM Courses WHERE FirstOffered >= '2004-01-01' AND FirstOffered < '2005-01-01';
ERROR 1451 (23000): Cannot delete or update a parent row: a foreign key constraint fails (`sdev300`.`facultycourses`, CONSTRAINT `facultycourses_ibfk_2` FOREIGN KEY (`CourseID`) REFERENCES `courses` (`CourseID`))
mysql>
```

9. Use appropriate select statements to display all records in all 3 tables. The Faculty query should display the Faculty by last name in descending order and Course query should display the courses in ascending order by course title. The display order of the FacultyCourses table is not specified. Hint: you should create three separate select statements to satisfy this requirement.

Faculty Table:

```
mysql> SELECT * FROM Faculty ORDER BY LastName DESC;
+--------+-----------+------------+------------------------+-----------+------------+
| EMPLID | FirstName | LastName   | Email                  | BirthYear | HireDate   |
+--------+-----------+------------+------------------------+-----------+------------+
|     19 | Shaynia   | Twain      | s.twain@gmail.com      |      1976 | 1994-01-24 |
|     15 | Ben       | Stiller    | b.stiller@gmail.com    |      1976 | 1999-10-31 |
|      4 | John      | Smith      | j.smith@gmail.com      |      1967 | 2001-04-10 |
|     17 | Christian | Slater     | c.slater@gmail.com     |      1989 | 2016-05-05 |
|      5 | Chris     | Sheppard   | c.sheppard@gmail.com   |      1985 | 2005-09-12 |
|     11 | Uncle     | Sam        | u.sam@gmail.com        |      1975 | 2000-07-04 |
|     13 | Kim       | Possible   | k.possible@gmail.com   |      2000 | 2019-06-04 |
|      8 | Julia     | Macgregor  | j.macgregor@gmail.com  |      1998 | 2019-05-14 |
|      2 | Yuriko    | Larrabee   | y.larrabee@gmail.com   |      1990 | 2015-01-02 |
|      6 | John      | Jacobs     | j.jacobs@gmail.com     |      1999 | 2019-06-01 |
|      3 | Jeanetta  | Hyneman    | j.hyneman@gmail.com    |      1959 | 2010-04-02 |
|      1 | Tomeka    | Hilder     | t.hilder@gmail.com     |      1981 | 2018-01-01 |
|     18 | Julie     | Hemmingway | j.hemmingway@gmail.com |      1995 | 2008-11-23 |
|     12 | Tom       | Hanks      | t.hanks@gmail.com      |      1961 | 2013-08-13 |
|     14 | Dora      | Explorer   | d.explorer@gmail.com   |      1986 | 2013-12-07 |
|     10 | Leo       | Davinci    | l.davinci@gmail.com    |      1990 | 2010-08-24 |
|     16 | Matt      | Damon      | m.damon@gmail.com      |      1988 | 2005-02-28 |
|      7 | Sarah     | Conner     | s.conner@gmail.com     |      1960 | 1994-02-01 |
|      9 | Zach      | Brown      | z.brown@gmail.com      |      1959 | 1999-11-04 |
|     20 | Adam      | Apple      | a.apple@gmail.com      |      1996 | 2013-05-25 |
+--------+-----------+------------+------------------------+-----------+------------+
20 rows in set (0.00 sec)

mysql>
```

Courses Table:

```
mysql> SELECT * FROM Courses ORDER BY CourseTitle;
+----------+----------+-----------+------------+-------------+-----------------------------------------------------+
| CourseID | DiscName | CourseNum | NumCredits | FirstOffered | CourseTitle                                         |
+----------+----------+-----------+------------+-------------+-----------------------------------------------------+
|       18 | WRTG     |       391 |          6 | 2016-06-01   | Advanced Research Writing                           |
|       15 | GVPT     |       170 |          6 | 2004-06-01   | American Government                                 |
|       12 | SDEV     |       300 |          6 | 2014-06-01   | Building Secure Web Applications                    |
|        6 | IFSM     |       201 |          6 | 2005-06-01   | Concepts and Applications of Information Technology |
|       16 | SDEV     |       250 |          6 | 2016-06-01   | Database Security                                   |
|       14 | SDEV     |       325 |          6 | 2016-06-01   | Detecting Software Vulnerabilities                  |
|        8 | NUTR     |       100 |          6 | 2003-06-01   | Elements of Nutrition                               |
|        5 | HIST     |       156 |          6 | 2000-06-01   | History of the United States to 1865                |
|        3 | CMIS     |       242 |          6 | 2013-06-01   | Intermediate Programming                            |
|        1 | CMIS     |       102 |          6 | 2015-06-01   | Intro Problem Solving Alg Design                    |
|        9 | WRTG     |       111 |          6 | 2000-06-01   | Intro to Academic Writing I                         |
|       10 | WRTG     |       112 |          6 | 2001-06-01   | Intro to Academic Writing II                        |
|       13 | BIOL     |       103 |          6 | 2007-06-01   | Introduction to Biology                             |
|        7 | LIBS     |       150 |          6 | 1999-06-01   | Introduction to Research                            |
|        2 | CMIS     |       141 |          6 | 2013-06-01   | Introductory Programming                            |
|        4 | CMIS     |       320 |          6 | 2014-06-01   | Relational Database Concepts & Applications         |
|       19 | SDEV     |       400 |          6 | 2002-06-01   | Secure Programming in the Cloud                     |
|       17 | SDEV     |       360 |          6 | 2001-06-01   | Secure Software Engineering                         |
|       20 | SDEV     |       460 |          6 | 2018-06-01   | Software Security Testing                           |
|       11 | HIST     |       125 |          6 | 2007-06-01   | Technological Transformations                       |
+----------+----------+-----------+------------+-------------+-----------------------------------------------------+
20 rows in set (0.00 sec)

mysql>
```

FacultyCourses Table:

```
mysql> SELECT * FROM FacultyCourses;
+-----------------+--------+----------+
| FacultyCourseID | EMPLID | CourseID |
+-----------------+--------+----------+
|               1 |     20 |        1 |
|               2 |     19 |        5 |
|               3 |     18 |        6 |
|               4 |     17 |        7 |
|               5 |     16 |        8 |
|               6 |     15 |        9 |
|               7 |     14 |       10 |
|               8 |     13 |       11 |
|               9 |     12 |       12 |
|              10 |     11 |       13 |
|              11 |     10 |       14 |
|              12 |      9 |       15 |
|              13 |      8 |       16 |
|              14 |      7 |       17 |
|              15 |      6 |       18 |
|              16 |      5 |       19 |
|              17 |      4 |       20 |
|              18 |      3 |        8 |
|              19 |      2 |        7 |
|              20 |      1 |        6 |
|              21 |     10 |        5 |
|              22 |     11 |        4 |
|              23 |     12 |        1 |
|              24 |     13 |        2 |
|              25 |     14 |        3 |
+-----------------+--------+----------+
25 rows in set (0.00 sec)

mysql>
```

10. Create a select statement to display all Faculty who have not taught at least 3 courses.

```
mysql> SELECT FacultyCourses.EMPLID, Faculty.FirstName, Faculty.LastName FROM FacultyCourses INNER JOIN Faculty ON FacultyCourses.EMPLID = Faculty.EMPLID GROUP BY EMPLID Having COUNT(FacultyCourses.EMPLID) < 3;
+--------+-----------+------------+
| EMPLID | FirstName | LastName   |
+--------+-----------+------------+
|      1 | Tomeka    | Hilder     |
|      2 | Yuriko    | Larrabee   |
|      3 | Jeanetta  | Hyneman    |
|      4 | John      | Smith      |
|      5 | Chris     | Sheppard   |
|      6 | John      | Jacobs     |
|      7 | Sarah     | Conner     |
|      8 | Julia     | Macgregor  |
|      9 | Zach      | Brown      |
|     10 | Leo       | Davinci    |
|     11 | Uncle     | Sam        |
|     12 | Tom       | Hanks      |
|     13 | Kim       | Possible   |
|     14 | Dora      | Explorer   |
|     15 | Ben       | Stiller    |
|     16 | Matt      | Damon      |
|     17 | Christian | Slater     |
|     18 | Julie     | Hemmingway |
|     19 | Shaynia   | Twain      |
|     20 | Adam      | Apple      |
+--------+-----------+------------+
20 rows in set (0.00 sec)

mysql>
```

11.Create a select statement to display all Courses offered before 1999.

```
mysql> SELECT CourseID, DiscName, CourseNum, NumCredits, FirstOffered, CourseTitle FROM Courses WHERE FirstOffered < "1999-01-01";
Empty set (0.00 sec)

mysql>
```

12. Use select and appropriate joins to display all columns from the Faculty and Course tables for each Faculty and Course in the FacultyCourse table. Note: this will be a 3-table join.

```
mysql> SELECT * From Faculty INNER JOIN FacultyCourses  on Faculty.EMPLID = FacultyCourses.EMPLID INNER JOIN Courses ON FacultyCourses.CourseID = Courses.CourseID;
```

EMPLID	FirstName	LastName	Email	BirthYear	HireDate	FacultyCourseID	EMPLID	CourseID	CourseID	DiscName	CourseNum	NumCredits	FirstOffered	CourseTitle
1	Tomeka	Hilder	t.hilder@gmail.com	1981	2018-01-01	20	1	6	6	IFSM	201	6	2005-06-01	Concepts and Applications of Information Technology
2	Yuriko	Larrabee	y.larrabee@gmail.com	1990	2015-01-02	19	2	7	7	LIBS	150	6	1999-06-01	Introduction to Research
3	Jeanetta	Hyneman	j.hyneman@gmail.com	1959	2010-04-02	18	3	8	8	NUTR	100	6	2003-06-01	Elements of Nutrition
4	John	Smith	j.smith@gmail.com	1967	2001-04-10	17	4	20	20	SDEV	460	6	2018-06-01	Software Security Testing
5	Chris	Sheppard	c.sheppard@gmail.com	1985	2005-09-12	16	5	19	19	SDEV	400	6	2002-06-01	Secure Programming in the Cloud
6	John	Jacobs	j.jacobs@gmail.com	1999	2019-06-01	15	6	18	18	WRTG	391	6	2016-06-01	Advanced Research Writing
7	Sarah	Conner	s.conner@gmail.com	1960	1994-02-01	14	7	17	17	SDEV	360	6	2001-06-01	Secure Software Engineering
8	Julia	Macgregor	j.macgregor@gmail.com	1998	2019-05-14	13	8	16	16	SDEV	250	6	2016-06-01	Database Security
9	Zach	Brown	z.brown@gmail.com	1959	1999-11-04	12	9	15	15	GVPT	170	6	2004-06-01	American Government
10	Leo	Davinci	l.davinci@gmail.com	1990	2010-08-24	11	10	14	14	SDEV	325	6	2016-06-01	Detecting Software Vulnerabilities
10	Leo	Davinci	l.davinci@gmail.com	1990	2010-08-24	21	10	5	5	HIST	156	6	2000-06-01	History of the United States to 1865
11	Uncle	Sam	u.sam@gmail.com	1975	2000-07-04	10	11	13	13	BIOL	103	6	2007-06-01	Introduction to Biology
11	Uncle	Sam	u.sam@gmail.com	1975	2000-07-04	22	11	4	4	CMIS	320	6	2014-06-01	Relational Database Concepts & Applications
12	Tom	Hanks	t.hanks@gmail.com	1961	2013-08-13	9	12	12	12	SDEV	300	6	2014-06-01	Building Secure Web Applications
12	Tom	Hanks	t.hanks@gmail.com	1961	2013-08-13	23	12	1	1	CMIS	102	6	2015-06-01	Intro Problem Solving Alg Design
13	Kim	Possible	k.possible@gmail.com	2000	2019-06-04	8	13	11	11	HIST	125	6	2007-06-01	Technological Transformations
13	Kim	Possible	k.possible@gmail.com	2000	2019-06-04	24	13	2	2	CMIS	141	6	2013-06-01	Introductory Programming
14	Dora	Explorer	d.explorer@gmail.com	1986	2013-12-07	7	14	10	10	WRTG	112	6	2001-06-01	Intro to Academic Writing II
14	Dora	Explorer	d.explorer@gmail.com	1986	2013-12-07	25	14	3	3	CMIS	242	6	2013-06-01	Intermediate Programming
15	Ben	Stiller	b.stiller@gmail.com	1976	1999-10-31	6	15	9	9	WRTG	111	6	2000-06-01	Intro to Academic Writing I
16	Matt	Damon	m.damon@gmail.com	1988	2005-02-28	5	16	8	8	NUTR	100	6	2003-06-01	Elements of Nutrition
17	Christian	Slater	c.slater@gmail.com	1989	2016-05-05	4	17	7	7	LIBS	150	6	1999-06-01	Introduction to Research
18	Julie	Hemmingway	j.hemmingway@gmail.com	1995	2008-11-23	3	18	6	6	IFSM	201	6	2005-06-01	Concepts and Applications of Information Technology
19	Shaynia	Twain	s.twain@gmail.com	1976	1994-01-24	2	19	5	5	HIST	156	6	2000-06-01	History of the United States to 1865
20	Adam	Apple	a.apple@gmail.com	1996	2013-05-25	1	20	1	1	CMIS	102	6	2015-06-01	Intro Problem Solving Alg Design

```
25 rows in set (0.00 sec)

mysql>
```