**Database Theory and Applications for Biomedical Research (BMIN 502/EPID 635)**
**Basic SQL Syntax: CREATE, SELECT, UPDATE, and DELETE**

1. **CREATE TABLE** *table_name ("field_name1" "data_type",.., "field_name_n" "data_type");*
   Example:      CREATE TABLE demographics
                 (study_id NUMBER(3),
                 dob DATE(),
                 sex NUMBER(1),
                 race CHAR(1),
                 hospital VARCHAR(10)
                 PRIMARY  KEY (study_id);
   This SQL code creates the table (demographics), but does not populate the database with data.
   One way to add data is with the INSERT INTO command

2. **INSERT INTO** *table_name (field_name _1, …, field_name_n) VALUES (value for field1,…etc);*
   Example:      INSERT INTO demographics
                 (study_id, dob, sex, race, hospital)
                 VALUES (1,'10/1/1998',1,'Caucasian','HUP'),
                         (2,'4/16/2004',2,'Asian','PUPMC'),
                         (314,'3/7/1995,1,'Caucasian','PAH'),
                         …
                         (10,'4/5/2000',1,'Asian','HUP');

This sample table is the result!

| study_id | dob | sex | race | hospital |
|---|---|---|---|---|
| 1 | 10/1/1998 | 1 | Caucasian | HUP |
| 2 | 4/16/2004 | 2 | Asian | PUPMC |
| 314 | 3/7/1995 | 1 | Caucasian | PAH |
| 40 | 9/1/2000 | 1 | African American | PAH |
| 506 | 11/15/1993 | 2 | African American | HUP |
| 600 | 7/13/2003 | 1 | Pacific Islander | HUP |
| 7 | 9/18/2007 | 2 | Caucasian | PAH |
| 823 | 1/4/1999 | 2 | African American | PUPMC |
| 9 | 10/4/1994 | 2 | Asian | PAH |
| 10 | 4/5/2000 | 1 | Asian | HUP |

3. **SELECT** *field_name* **FROM** *table_name;*
   This command selects a field from a table
   Example:      SELECT dob
                 FROM demographics;
   Result:

| dob |
|---|
| 10/1/1998 |
| 4/16/2004 |
| 3/7/1995 |
| 9/1/2000 |
| 11/15/1993 |
| 7/13/2003 |
| 9/18/2007 |
| 1/4/1999 |
| 10/4/1994 |
| 4/5/2000 |

4. **SELECT *field_name_1, field_name_2,…, field_name_n* FROM *table_name;*{}**
   This command selects fields from a table
   Example:     SELECT dob, sex, race
                FROM demographics;
   Result:

   | dob | sex | race |
   | --- | --- | --- |
   | 10/1/1998 | 1 | Caucasian |
   | 4/16/2004 | 2 | Asian |
   | 3/7/1995 | 1 | Caucasian |
   | 9/1/2000 | 1 | African American |
   | 11/15/1993 | 2 | African American |
   | 7/13/2003 | 1 | Pacific Islander |
   | 9/18/2007 | 2 | Caucasian |
   | 1/4/1999 | 2 | African American |
   | 10/4/1994 | 2 | Asian |
   | 4/5/2000 | 1 | Asian |

5. **SELECT * FROM *table_name;*{}**
   This command selects all fields from a table
   Example:     SELECT *
                FROM demographics;
   Result: Shown above in parent table

6. **SELECT DISTINCT *field_name* FROM *table_name;*{}**
   This command selects all unique instances from a field from a table
   Example:     SELECT DISTINCT race
                FROM demographics;
   Result:

   | race |
   | --- |
   | Caucasian |
   | Asian |
   | African American |
   | Pacific Islander |
   | African American |

7. **SELECT *field_name* FROM *table_name* WHERE *condition;*{}**
   This command selects a field from a table, filtered by the condition
   Example:     SELECT race
                FROM demographics
                WHERE race='Caucasian';
   Result:

   | race |
   | --- |
   | Caucasian |
   | Caucasian |
   | Caucasian |

8.  **SELECT *field_name* FROM *table_name* WHERE *condition* AND|OR *condition***
    The AND|OR allows you to express a compound condition or conditions
    Example 1:    SELECT subject_id
                  FROM demographics
                  WHERE race=Caucasian'
                  AND sex=1
    Result:

| sex | race |
|-----|------|
| 1 | Caucasian |
| 1 | Caucasian |
| 1 | Asian |

    Example 2:    SELECT subject_id
                  FROM demographics
                  WHERE subject_id>100
                  OR (hospital='HUP' AND race=Asian')
    Result:

| study_id | race | hospital |
|----------|------|----------|
| 2 | Asian | PUPMC |
| 314 | Caucasian | PAH |
| 506 | African American | HUP |
| 600 | Pacific Islander | HUP |
| 823 | African American | PUPMC |
| 10 | Asian | HUP |

9.  **SELECT *field_name* FROM *table_name* WHERE *field_name* IN (value1, value 2, …)**
    Example:    SELECT *
                FROM demographics
                WHERE race IN ('Caucasian', 'Asian')
    Result:

| study_id | dob | sex | race | hospital |
|----------|-----|-----|------|----------|
| 1 | 10/1/1998 | 1 | Caucasian | HUP |
| 2 | 4/16/2004 | 2 | Asian | PUPMC |
| 314 | 3/7/1995 | 1 | Caucasian | PAH |
| 7 | 9/18/2007 | 2 | Caucasian | PAH |
| 9 | 10/4/1994 | 2 | Asian | PAH |
| 10 | 4/5/2000 | 1 | Asian | HUP |

**10. SELECT *field_name* FROM *table_name* WHERE *field_name* BETWEEN (value1, value 2, …)**

Example:     SELECT *
FROM demographics
WHERE study_id BETWEEN (300, 800)

Result:

| study_id | dob | sex | race | hospital |
| --- | --- | --- | --- | --- |
| 314 | 3/7/1995 | 1 | Caucasian | PAH |
| 506 | 11/15/1993 | 2 | African American | HUP |
| 600 | 7/13/2003 | 1 | Pacific Islander | HUP |

**11. SELECT *field_name* FROM *table_name* WHERE *field_name* LIKE *pattern***

Example:     SELECT *
FROM demographics
WHERE hospital LIKE '%UP%

This returns records with hospital of HUP and PUPMC

Result:

| study_id | dob | sex | race | hospital |
| --- | --- | --- | --- | --- |
| 1 | 10/1/1998 | 1 | Caucasian | HUP |
| 2 | 4/16/2004 | 2 | Asian | PUPMC |
| 506 | 11/15/1993 | 2 | African American | HUP |
| 600 | 7/13/2003 | 1 | Pacific Islander | HUP |
| 823 | 1/4/1999 | 2 | African American | PUPMC |
| 10 | 4/5/2000 | 1 | Asian | HUP |

**12. SELECT *field_name* FROM *table_name* ORDER BY field_name [ASC, DESC]**

Example:     SELECT *
FROM demographics
ORDER BY study_ID ASC

Result:

| study_id | dob | sex | race | hospital |
| --- | --- | --- | --- | --- |
| 1 | 10/1/1998 | 1 | Caucasian | HUP |
| 2 | 4/16/2004 | 2 | Asian | PUPMC |
| 7 | 9/18/2007 | 2 | Caucasian | PAH |
| 9 | 10/4/1994 | 2 | Asian | PAH |
| 10 | 4/5/2000 | 1 | Asian | HUP |
| 40 | 9/1/2000 | 1 | African American | PAH |
| 314 | 3/7/1995 | 1 | Caucasian | PAH |
| 506 | 11/15/1993 | 2 | African American | HUP |
| 600 | 7/13/2003 | 1 | Pacific Islander | HUP |
| 823 | 1/4/1999 | 2 | African American | PUPMC |

### 13. UPDATE *table_name* SET *field_name = value;*
This command replaces a value in a field with some value
Example:     UPDATE demographics
             SET hospital='1'
             WHERE hospital='HUP';
Result:

| study_id | dob | sex | race | hospital |
|---|---|---|---|---|
| 1 | 10/1/1998 | 1 | Caucasian | 1 |
| 2 | 4/16/2004 | 2 | Asian | PUPMC |
| 314 | 3/7/1995 | 1 | Caucasian | PAH |
| 40 | 9/1/2000 | 1 | African American | PAH |
| 506 | 11/15/1993 | 2 | African American | 1 |
| 600 | 7/13/2003 | 1 | Pacific Islander | 1 |
| 7 | 9/18/2007 | 2 | Caucasian | PAH |
| 823 | 1/4/1999 | 2 | African American | PUPMC |
| 9 | 10/4/1994 | 2 | Asian | PAH |
| 10 | 4/5/2000 | 1 | Asian | 1 |

### 14. DELETE FROM *table_name* WHERE *condition;*
This command deletes records from a table
Example:     DELETE FROM demographics
             WHERE sex=1;
Result:

| study_id | dob | sex | race | hospital |
|---|---|---|---|---|
| 2 | 4/16/2004 | 2 | Asian | PUPMC |
| 506 | 11/15/1993 | 2 | African American | HUP |
| 7 | 9/18/2007 | 2 | Caucasian | PAH |
| 823 | 1/4/1999 | 2 | African American | PUPMC |
| 9 | 10/4/1994 | 2 | Asian | PAH |