

Syllabus

Online IT 222(CRN #62335) Data Base Management Systems

Instructor: James Hart / hart56@unm.edu

Office Room Number: B 123

Instructor's Campus Phone: 505.925.8720 / Mobile 505.239.3435

Office Hours: MW 3:00 PM – 4:00PM, TTh 10:00 AM – 3:00PM or ARR

email: Be sure to check your contact information in Banner and keep it updated. UNM email as our official form of course communication. When communicating with your instructor always include class name in the subject header.

IT 222 Database Management Systems. (3) *This course is a continuation of IT 122. Students will write more complex generic and reusable DBMS programs to build finished, turnkey applications. Prerequisite: IT 122.*

COURSE STUDENT LEARNING OUTCOMES: See attached or in course's learn.unm.edu

TEXTBOOK: Instructor issues individual student account for Oracle's Database Foundations. From this account: <https://academy.oracle.com/en/oa-sign-in.html> students have access to quizzes and project labs.

ATTENDANCE POLICY: Students are required to do a weekly "check in" through ZOOM or WebEx to address course materials and questions for the week. Time and dates of these "check in" sessions will be determined after class starts. Attendance to these sessions, live or recorded, is mandatory. Unless with instructor permission four missed weekly sessions will result in student being dropped.

GRADING POLICY

Lesson Practices	20%
APEX Usage	10%
Final Project	10%
Section quizzes	10%
Weekly "Check in"	10%
Mid Term	20%
Final	20%
Total	100%

LETTER GRADE DETERMINATION

A 90 +
B 80 - 89
C 70 - 79
D 60 -69
F < 60

The Oracle Academy breaks this curriculum into 20 sections. The sections are composed of lessons. Each lesson is composed of student guides, practices and projects. Instructor will determine due dates for practices and projects. Due dates are enforced unless instructor is notified prior to the due date. Late work is penalized 10%

Academic Integrity

Having academic integrity is paramount to your success in any class. Plagiarism or cheating is not tolerated. Any instance of this will result in a grade of zero for that assignment. Here is the link to the UNM Academic Dishonesty Policy:

<https://policy.unm.edu/regents-policies/section-4/4-8.html>. The policy states:

Each student is expected to maintain the highest standards of honesty and integrity in academic and professional matters. The University reserves the right to take disciplinary action, up to and including dismissal, against any student who is found guilty of academic dishonesty or who otherwise fails to meet the expected standards. Any student judged to have engaged in academic dishonesty in course work may receive a reduced or failing grade for the work in question and/or for the course.

Academic Dishonesty is defined as:

"Academic dishonesty" includes, but is not limited to, dishonesty in quizzes, tests, or assignments; claiming credit for work not done or done by others; hindering the academic work of other students; misrepresenting academic or professional qualifications within or without the University; and nondisclosure or misrepresentation in filling out applications or other University records.

LIBRARY USAGE: Be sure to always check out the library if you feel you need additional reading materials. They are open for any order suggestions you may have.

STUDENTS WITH DISABILITIES:

If you have a documented disability, the Equal Access Services office will provide me with a letter outlining your accommodations. I will then discuss the accommodations with you to determine the best learning environment. If you feel that you need accommodations, but have not documented your disability, please contact Jeanne Lujan, the coordinator for Equal Access Services at 925-8560 or skirtley@unm.edu.

EQUAL OPPORTUNITY AND NON-DISCRIMINATION

In an effort to meet obligations under Title IX, UNM faculty, Teaching Assistants, and Graduate Assistants are considered "responsible employees" by the Department of Education (see page 15 - <http://www2.ed.gov/about/offices/list/ocr/docs/qa-201404-title-ix.pdf>). This designation requires that any report of gender discrimination which includes sexual harassment, sexual misconduct and sexual violence made to a faculty member, TA, or GA must be reported to the Title IX Coordinator at the Office of Equal Opportunity (oeo.unm.edu). For more information on the campus policy regarding sexual misconduct, see: <https://policy.unm.edu/university-policies/2000/2740.html>.

Dates for Reference :

August 30	Enrollment Cancellation for non-payment Last Day to add sections or change credit hours via LoboWEB Last day to change grade mode on LoboWEB
September 6	Last Day to Drop with 100% Tuition Refund and without "W" Grade
October 10	University Holiday - Fall Break
November 8	Last Day to Drop without Dean's Permission
November 28	University Holiday - Thanksgiving
December 6	Last Day to Change Grading Options Last Day to Drop with Dean's Permission with form
December 9	Last Day to Withdraw with Student Services Permission

COURSE OUTLINE: Once logged into <https://academy.oracle.com/en/oa-sign-in.html> and in class, please note in DP_x_y , x is the section and y is the lesson as shown in Week 1. **Please note that this course outline is subject to change. If changes occur you will be notified.**

Week 1 / Aug. 19

Introduction / Section 0

- **Weekly “Check in” Please refer to your UNM email**
- Download the 4 OracleFlix files from Section 0’s Download Center
- Download 2 Schemas and APEX Student Guide from Section 0’s Download Center

Introduction / Section 1

- Read Section 1 Student Lesson 1 or referred to as **DP_1_1**
- Attempt DP_1_1_Practice.docx
- Read Section 1 Student Lesson 2 or referred to as **DP_1_2**
- Attempt Section 1 Student Lesson 2 Practice or **DP_1_2_Practice.docx**
- Read Section 1 Student Lesson 2 or referred to as **DP_1_3**
- Attempt Section 1 Student Lesson 2 Practice or **DP_1_3_Practice.docx**
- **Review of how to use APEX**
- **TAKE SECTION 1 QUIZ**

Week 2 / Aug 26

SELECT and WHERE / Section 2

- **Weekly “Check in”**
- Read DP_2_1
- Attempt DP_2_1_Practice.docx
- Read DP_2_2
- Attempt DP_2_2_Practice.docx
- Read DP_2_3
- Attempt DP_2_3_Practice.docx
- Demonstrate with APEX
- **TAKE SECTION 2 QUIZ**

Week 3 / Sept. 2
Labor Day Sept. 2

Section 3 / WHERE, ORDER BY, and Intro to Functions

- **Weekly “Check in”**
- Read DP_3_1
- Attempt DP_3_1_Practice.docx
- Read DP_3_2
- Attempt DP_3_2_Practice.docx
- Read DP_3_3
- Attempt DP_3_3_Practice.docx
- Demonstrate with APEX
- **TAKE SECTION 3 QUIZ**

Week 4 / Sept. 9

- **Weekly “Check in”**
- ***Single Row Functions Part 1 / Section 4***
- Read DP_4_1
- Attempt DP_4_1_Practice.docx
- Read DP_4_2
- Attempt DP_4_2_Practice.docx
- Read DP_4_3
- Attempt DP_4_3_Practice..docx
- **TAKE SECTION 4 QUIZ**

Week 5 / Sept. 16

- **Weekly “Check in”**
- ***Single Row Functions Part 2 / Section 5***
- Read DP_5_1
- Attempt DP_5_1_Practice.docx
- Read DP_5_2
- Attempt DP_5_2_Practice.docx
- Read DP_5_3
- Attempt DP_5_3_Practice.docx
- Demonstrate with APEX
- ***TAKE SECTION 5 QUIZ***

Week 6 / Sept. 23

Weekly “Check in”

JOINS Part 1 / Section 6

- Read DP_6_1
- Read DP_6_2
- Read DP_6_3
- Read DP_6_4
- Attempt assigned Practice.docx's
- Demonstrate with APEX
- ***TAKE SECTION 6 Quiz***

Week 7 / Sept. 30

• **Weekly “Check in”**

JOINS Part 2 / Section 7

- Read DP_7_1
- Read DP_7_2
- Attempt assigned Practice.docx's
- Demonstrate with APEX
- ***TAKE SECTION 7 Quiz***

Week 8 / Oct 7

Fall Break Oct. 11 & 12

- **Weekly “Check in”**

Group Functions Part 1 / Section 8

- Read DP_8_1
- Read DP_8_2
- Review DP_3_4_Project.doc
- Attempt assigned Practice.docx’s
- Demonstrate with APEX
- ***TAKE SECTION 8 Quiz***

Week 9 / Oct 14

MIDTERM REVIEW and EXAM

Week 10 / Oct 21

- **Weekly “Check in”**

Group Functions Part 2 / Section 9

- Read DP_9_1
- Read DP_9_2
- Read DP_9_3
- Attempt assigned Practice.docx’s
- Demonstrate with APEX
- ***TAKE SECTION 9 Quiz***

Week 11 / Oct 28

- **Weekly “Check in”**

Subqueries / Section 9 and Ensuring Quality / Section 10

- Read DP_9_1
- Read DP_9_2
- Read DP_9_3
- Read DP_10_1
- Attempt assigned Practice.docx’s
- ***TAKE SECTION 10 Quiz***
- ***TAKE SECTION 11 Quiz***
- ***Start discussing final project***

Week 12 / Nov 4

- **Weekly “Check in”**
DML / Section 12 and DDL / Section 13
- Read DP_12_1
- Read DP_12_2
- Read DP_12_3
- Read DP_13_1
- Read DP_13_2
- Read DP_13-3
- Attempt assigned Practice.docx’s
- Demonstrate with APEX
- **TAKE SECTION 12 Quiz**
- **TAKE SECTION 13 Quiz**
- **Discuss final project**

Week 13 / Nov 11

- **Weekly “Check in”**
Constraints / Section 14 and Views / Section 15
- Read DP_14 and DP_15
- Attempt assigned Practice.docx’s
- Demonstrate with APEX
- **TAKE SECTION 14 Quiz**
- **TAKE SECTION 15 Quiz**
- **Discuss final project**

Week 14 / Nov 18

- **Weekly “Check in”**
Constraints / Section 16 and Views / Section 17
- Read DP_16 and DP_17
- Attempt assigned Practice.docx’s
- Demonstrate with APEX
- **TAKE SECTION 16 Quiz**
- **TAKE SECTION 17 Quiz**
- **Discuss final project**

Week 15 / Nov 26

Thanksgiving Nov. 28 & 29

- **Weekly “Check in”**

Constraints / Section 18

- Read DP_18
- Attempt assigned Practice.docx’s
- Demonstrate with APEX
- ***TAKE SECTION 18 Quiz***
- ***Work on Final Project***

Week 16 / Dec. 2

- **Weekly “Check in”**

Final Project Due

Week 17 / Dec. 9

Online Course Final

Course Objectives

Section 1 - Introduction

1-1 Oracle Application Express

- Distinguish between application software and system software and give an example of each
- Log-in to the Oracle Application Express practice environment
- Execute a simple query to retrieve information from the Database
- Apply the rules of SQL to display all columns and a subset of columns specified by criteria

1-2 Relational Database Technology

- Define and give an example of a relational database
- Identify table-key terms, including row, column, field, primary key, and foreign key
- Relate the importance of databases to everyday life

1-3 Anatomy of a SQL Statement

- Match projection and selection with their correct capabilities
- Create a basic SELECT statement
- Use the correct syntax to display all rows in a table
- Use the correct syntax to select specific columns in a table, modify the way data is displayed, and perform calculations using arithmetic expressions and operators

Section 2 – SELECT and WHERE

2-1 Columns, Characters, and Rows

- Apply the concatenation operator to link columns to other columns, arithmetic expressions, or constant values to create a character expression
- Use column aliases to rename columns in the query result
- Enter literal values of type character, number, or date into a SELECT statement
- Define and use DISTINCT to eliminate duplicate rows
- Edit, execute, and save SQL statements in Oracle Application Express

2-2 Limit Rows Selected

- Apply SQL syntax to restrict the rows returned from a query
- Demonstrate application of the WHERE clause syntax
- Explain why it is important, from a business perspective, to be able to easily limit data retrieved from a table
- Construct and produce output using a SQL query containing character strings and date values

2-3 Comparison Operators

- Apply the proper comparison operator to return a desired result
- Demonstrate proper use of BETWEEN, IN, and LIKE conditions to return a desired result
- Distinguish between zero and NULL, the latter of which is unavailable, unassigned, unknown, or inapplicable

- Explain the use of comparison conditions and NULL

Section 3 - WHERE, ORDER BY, and Intro to Functions

3-1 Logical Comparisons and Precedence Rules

- Evaluate logical comparisons to restrict the rows returned based on two or more conditions
- Apply the rules of precedence to determine the order in which expressions are evaluated and calculated

3-2 Sorting Rows

- Construct a query to sort a result set in ascending or descending order
- State the order in which expressions are evaluated and calculated based on the rules of precedence
- Construct a query to order a result set using a column alias
- Construct a query to order a result set for single or multiple columns

3-3 Introduction to Functions

- Identify appropriate applications of single-row functions in query statements
- Classify a function as a single-row or multi-row function
- Differentiate between single-row functions and multi-row functions and the results returned by each

Section 4 - Single Row Functions Part I

4-1 Case and Character Manipulation

- Select and apply single-row functions that perform case conversion and/or character manipulation
- Select and apply character case-manipulation functions LOWER, UPPER, and INITCAP in a SQL query

- Select and apply character-manipulation functions CONCAT, SUBSTR, LENGTH, INSTR, LPAD, RPAD, TRIM, and REPLACE in a SQL query
- Write flexible queries using substitution variables

4-2 Number Functions

- Select and apply the single-row number functions ROUND, TRUNC, and MOD in a SQL query
- Distinguish between the results obtained when TRUNC is applied to a numeric value and ROUND is applied to a numeric value
- State the implications for business when applying TRUNC and ROUND to numeric values

4-3 Date Functions

- Demonstrate the use of SYSDATE and date functions
- State the implications for world businesses to be able to easily manipulate data stored in date format

Section 5 - Single Row Functions Part II

5-1 Conversion Functions

- Provide an example of an explicit data-type conversion and an implicit data-type conversion
- Explain why it is important, from a business perspective, for a language to have built-in data-conversion capabilities
- Construct a SQL query that correctly applies TO_CHAR, TO_NUMBER, and TO_DATE single-row functions to produce a desired result
- Apply the appropriate date and/or character format model to produce a desired output
- Explain and apply the use of YY and RR to return the correct year as stored in the database

5-2 NULL Functions

- Demonstrate and explain the evaluation of a nested function

- List at least four general functions that work with any data type and relate to handling null values
- Explain the use of the COALESCE and the NVL functions
- Explain the use of general functions to deal with null values in data
- Construct and execute a SQL query that correctly applies NVL, NVL2, NULLIF, and COALESCE single-row functions

5-3 Conditional Expressions

- Compare and contrast the DECODE and CASE functions
- Construct and execute a SQL query that correctly uses the DECODE and CASE functions
- Construct and execute two methods for implementing IF-THEN-ELSE conditional logic

Section 6 - JOINS Part I

6-1 Cross Joins and Natural Joins

- Construct and execute a natural join using ANSI-99 SQL join syntax
- Create a cross join using ANSI-99 SQL join syntax
- Explain the importance of having a standard for SQL as defined by ANSI
- Describe a business need for combining information from multiple data sources

6-2 Join Clauses

- Construct and execute a join with the ANSI-99 USING Clause
- Construct and execute a join with the ANSI-99 ON Clause
- Construct and execute an ANSI-99 query that joins three tables

6-3 Inner versus Outer Joins

- Compare and contrast an inner and an outer join
- Construct and execute a query to use a left outer join
- Construct and execute a query to use a right outer join
- Construct and execute a query to use a full outer join

6-4 Self-Joins and Hierarchical Queries

- Construct and execute a SELECT statement to join a table to itself using a self-join
- Interpret the concept of a hierarchical query
- Create a tree-structured report
- Format hierarchical data
- Exclude branches from the tree structure

Section 7 - JOINS Part II

7-1 Oracle Equijoin and Cartesian Product

- Name the Oracle proprietary joins and their ANSI/ISO SQL: 99 counterparts
- Construct and execute a SELECT statement that results in a Cartesian product
- Construct and execute SELECT statements to access data from more than one table using an equijoin
- Construct and execute SELECT statements that add search conditions using the AND operator
- Apply the rule for using table aliases in a join statement

7-2 Oracle Nonequijoins and Outer Joins

- Construct and execute a SELECT statement to access data from more than one table using a nonequijoin
- Create and execute a SELECT statement to access data from more than one table using an Oracle outer join

Section 8 - Group Functions Part I

8-1 Group Functions

- Define and give an example of the seven group functions: SUM, AVG, COUNT, MIN, MAX, STDDEV, VARIANCE
- Construct and execute a SQL query using group functions
- Construct and execute group functions that operate only with numeric data types

8-2 COUNT, DISTINCT, NVL

- Construct and execute a SQL query using the COUNT group function
- Use DISTINCT and the NVL function with group functions

Section 9 - Group Functions Part II

9-1 Using Group By and Having Clauses

- Construct and execute a SQL query using GROUP BY
- Construct and execute a SQL query using GROUP BY ... HAVING
- Construct and execute a GROUP BY on more than one column
- Nest group functions

9-2 Using Rollup and Cube Operations, and Grouping Sets

- Use ROLLUP to produce subtotal values
- Use CUBE to produce cross-tabulation values
- Use GROUPING SETS to produce a single result set
- Use the GROUPING function to identify the extra row values created by either a ROLLUP or CUBE operation

9-3 Using Set Operators

- Define and explain the purpose of Set Operators
- Use a set operator to combine multiple queries into a single query
- Control the order of rows returned using set operators

Section 10 – Subqueries

10-1 Fundamentals of Subqueries

- Define and explain the purpose of subqueries for retrieving data
- Construct and execute a single-row subquery in the WHERE clause
- Distinguish between single-row and multiple-row subqueries

10-2 Single-Row Subqueries

- Construct and execute a single-row subquery in the WHERE clause or HAVING clause
- Construct and execute a SELECT statement using more than one subquery
- Construct and execute a SELECT statement using a group function in the subquery

10-3 Multiple-Row Subqueries

- Correctly use the comparison operators IN, ANY, and ALL in multiple-row subqueries
- Construct and execute a multiple-row subquery in the WHERE clause or HAVING clause
- Describe what happens if a multiple-row subquery returns a null value
- Understand when multiple-row subqueries should be used, and when it is safe to use a single-row subquery
- Distinguish between pair-wise and non-pair-wise subqueries
- Create a query using the EXISTS and NOT EXISTS operators to test for returned rows from the subquery

10-4 Correlated Subqueries

- Identify when correlated subqueries are needed.
- Construct and execute correlated subqueries.
- Construct and execute named subqueries using the WITH clause.
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Section 11 – Ensuring Quality Queries Part I

11-1 Ensuring Quality Query Results

- Create a query to produce specified data
- Modify a query to produce specified data

Section 12 - DML

12-1 INSERT Statements

- Explain the importance of being able to alter the data in a database
- Construct and execute INSERT statements which insert a single row using a VALUES clause
- Construct and execute INSERT statements that use special values, null values, and date values
- Construct and execute INSERT statements that copy rows from one table to another using a subquery

12-2 Updating Column Values and Deleting Rows

- Construct and execute an UPDATE statement
- Construct and execute a DELETE statement
- Construct and execute a query that uses a subquery to update and delete data from a table
- Construct and execute a query that uses a correlated subquery to update and delete from a table
- Explain how foreign-key and primary-key integrity constraints affect UPDATE and DELETE statements
- Explain the purpose of the FOR UPDATE Clause in a SELECT statement

12-3 DEFAULT Values, MERGE, and Multi-Table Inserts

- Understand when to specify a DEFAULT value
- Construct and execute a MERGE statement
- Construct and execute DML statements using subqueries
- Construct and execute multi-table inserts

Section 13 - DDL

13-1 Creating Tables

- List and categorize the main database objects
- Review a table structure
- Describe how schema objects are used by the Oracle database
- Create a table using the appropriate data type for each column
- Explain the use of external tables
- Query the Data Dictionary to obtain the names and other attributes of database objects

13-2 Using Data Types

- Create a table using `TIMESTAMP` and `TIMESTAMP WITH TIME ZONE` column data types
- Create a table using `INTERVAL YEAR TO MONTH` and `INTERVAL DAY TO SECOND` column data types
- Give examples of organizations and personal situations where it is important to know to which time zone a date-time value refers
- List and provide an example of each of the number, date, and character data types

13-3 Modifying a Table

- Explain why it is important to be able to modify a table
- Explain and provide an example for each of the DDL statements—`ALTER`, `DROP`, `RENAME`, and `TRUNCATE`—and the effect each has on tables and columns
- Construct a query and execute the `ALTER TABLE` commands `ADD`, `MODIFY`, and `DROP`
- Explain and perform `FLASHBACK QUERY` on a table
- Explain and perform `FLASHBACK` table operations
- Track the changes to data over a period of time
- Explain the rationale for using `TRUNCATE` versus `DELETE` for tables
- Add a comment to a table using the `COMMENT ON TABLE` command
- Name the changes that can and cannot be made to modify a column
- Explain when and why the `SET UNUSED` statement is advantageous

Section 14 – Constraints

14-1 Intro to Constraints; NOT NULL and UNIQUE Constraints

- Define the term "constraint" as it relates to data integrity
- State when it is possible to define a constraint at the column level, and when it is possible at the table level
- State why it is important to give meaningful names to constraints
- State which data integrity rules are enforced by NOT NULL and UNIQUE constraints
- Write a CREATE TABLE statement which includes NOT NULL and UNIQUE constraints at the table and column levels
- Explain how constraints are created at the time of table creation

14-2 PRIMARY KEY, FOREIGN KEY, and CHECK Constraints

- Define and give an example of a PRIMARY KEY, FOREIGN KEY, and CHECK constraint
- Explain the purpose of defining PRIMARY KEY, FOREIGN KEY, and CHECK constraints
- Demonstrate the creation of constraints at the column level and table level in a CREATE TABLE statement
- Evaluate a business problem requiring the addition of a PRIMARY KEY and FOREIGN KEY constraint and write the code to execute the change

14-3 Managing Constraints

- List four different functions that the ALTER statement can perform on constraints
- Write ALTER TABLE statements to add, drop, disable, and enable constraints
- Name a business function that would require a DBA to drop, enable, and/or disable a constraint or use the CASCADE syntax

- Query the data dictionary for USER_CONSTRAINTS and interpret the information returned

Section 15 – Views

15-1 Creating Views

- List three uses for views from the standpoint of a database administrator
- Explain, from a business perspective, why it is important to be able to create and use logical subsets of data derived from one or more tables
- Create a view with and without column aliases in the subquery using a single base table
- Create a complex view that contains group functions to display values from two tables
- Retrieve data from a view

15-2 DML Operations and Views

- Write and execute a query that performs DML operations on a simple view
- Name the conditions that restrict your ability to modify a view using DML operations
- Write and execute a query using the WITH CHECK OPTION clause
- Explain the use of WITH CHECK OPTION as it applies to integrity constraints and data validation
- Apply the WITH READ ONLY option to a view to restrict DML operations

15-3 Managing Views

- Create and execute a SQL statement that removes a view
- Create and execute a query using an inline view
- Create and execute a top-n-analysis query

Section 16 - Sequences and Synonyms

16-1 Working With Sequences

- List at least three useful characteristics of a sequence
- Write and execute a SQL statement that creates a sequence
- Query the data dictionary using USER_SEQUENCES to confirm a sequence definition
- Apply the rules for using NEXTVAL to generate sequential unique numbers in a table

- List the advantages and disadvantages of caching sequence values
- Name three reasons why gaps can occur in a sequence

16-2 Indexes and Synonyms

- Define an index and its use as a schema object
- Name the conditions that cause an index to be created automatically
- Create and execute a CREATE INDEX and DROP INDEX statement
- Create and execute a function-based index ○ Create private and public synonyms

Section 17 - Privileges and Regular Expressions

17-1 Controlling User Access

- Compare the difference between object privileges and system privileges
- Construct the two commands required to enable a user to have access to a database
- Construct and execute a GRANT... ON ...TO statement to assign privileges to objects in their schema to other users and/or PUBLIC
- Query the data dictionary to confirm privileges granted

17-2 Creating and Revoking Object Privileges

- Explain what a ROLE is and what its advantages are

- Construct a statement to create a ROLE and GRANT privileges to it
- Construct a GRANT .. ON .. TO.. WITH GRANT OPTION statement to assign privileges on objects in your schema to other users and/or PUBLIC
- Construct and execute a statement to REVOKE object privileges from other users and/or from PUBLIC
- Distinguish between privileges and roles
- Explain the purpose of a database link

17-3 Regular Expressions

- Describe regular expressions
- Use regular expressions to search, match, and replace strings in SQL statements
- Construct and execute regular expressions and check constraints

Section 18 - TCL

18-1 Database Transactions

- Define the terms COMMIT, ROLLBACK, and SAVEPOINT as they relate to data transactions
- List three advantages of the COMMIT, ROLLBACK, and SAVEPOINT statements
- Explain why it is important, from a business perspective, to be able to control the flow of transaction processing

Section 19 - Final Project and Exam Review

19-1 Testing

- Develop and apply a strategy for testing that a database functions as designed

19-2 Final Project Database Creation

- Apply SQL concepts to create a functional database appropriate for a small business

19-3 Final Exam Review

- Review the key points about case and character manipulation
- Review number, date, conversion, and general functions

- Review conditional expressions
- Review Cartesian product and join operations
- Review non-equijoins, outer joins, self joins, cross joins, natural joins, and join clauses
- Review group functions, group by syntax, and having clauses
- Review single-row and multiple row subqueries
- Review pair-wise and non-pair-wise subqueries
- Review correlated subqueries
- Review DML statements insert, update, delete, merge, and multi-table inserts
- Review DDL statements CREATE, ALTER, RENAME, TRUNCATE, FLASHBACK TABLE, DROP, and FLASHBACK QUERY
- Review DCL statements CREATE and REVOKE object privileges

Section 20 - Ensuring Quality Queries Part II

20-1 Ensuring Quality Query Results - Advanced Techniques

- Create an advanced query to produce specified data
- Modify an advanced query to produce specified data