Course Outline for CIS 9002

ORACLE: DATABASE DESIGN AND SQL PROGRAMMING

Effective: Fall 2011

I. CATALOG DESCRIPTION:
   CIS 9002 — ORACLE: DATABASE DESIGN AND SQL PROGRAMMING — 3.00 units

   In Database Design, students learn to analyze business scenarios and create data models, a conceptual representation of an organization's information. In Database Programming with SQL, students implement their database design by creating a physical database using Oracle Structured Query Language (SQL) to create, query, manipulate, and control access to the data in a relational database.. The SQL commands, functions, and operators supported by Oracle as extensions to standard SQL are emphasized. Students learn to create and maintain database objects such as tables, indexes, views, constraints, and sequences. Prepare students for the Oracle Certified Professional (OCP) exam.

   2.50 Units Lecture 0.50 Units Lab

   Strongly Recommended
   CIS 57 - Database Concepts

   Grading Methods:
   Letter or P/NP

   Discipline:

	MIN
Lecture Hours:	45.00
Lab Hours:	27.00
Total Hours:	72.00

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: 2

III. PREREQUISITE AND/OR ADVISORY SKILLS:

   Before entering this course, it is strongly recommended that the student should be able to:

   A. CIS57

IV. MEASURABLE OBJECTIVES:
   Upon completion of this course, the student should be able to:
   A. Analyze business scenarios and create data models
   B. Transform business requirements into an operational database;
   C. Create physical relational database tables to implement a database design;
   D. Manage a business project that delivers a database design and model for a potential client;
   E. Create, maintain, and manipulate database objects;
   F. Prepare for Introduction to Oracle - SQL Certification exam;
   G. Write SQL SELECT statements that display data from single or multiple tables;
   H. Understand the physical and logical storage of the database, and be able to manage space allocation and growth;
   I. Create and manage tables views, constraints, synonyms, sequences, and indexes;
   J. Restrict, sort, aggregate, and manipulate data using both single and group functions;

V. CONTENT:
   A. Database Design
      1. Introduction
         a. Introduction to the Oracle Academy
         b. Introduction to the Oracle Corporation
         c. History of the Database
         d. Major Transformations in Computing
      2. DB Models concepts and terminology
         a. Conceptual and Physical Models
         b. Entities and Instances
         c. Attributes and Unique Identifiers
      3. DB Relationships
         a. Identifying Relationships
         b. ER Diagramming Conventions

        c. Drawing Relationships and Speaking ERDish
        d. Data vs. Information
        e. Supertypes and Subtypes
        f. Documenting Business Rules
        g. Relationship Transferability
        h. Relationship Types
        i. Resolving Many-to-Many Relationships
        j. Normalization and First Normal Form
    4. DB Forms
        a. Finding a Context
        b. Normalization and First Normal Form
        c. Second Normal Form
        d. Review of Unique Identifiers
        e. Third Normal Form and Identification
        f. Hierarchies and Recursive Relationships
    5. DB Modeling
        a. Drawing Conventions for Readability
        b. Generic Modeling
        c. Introduction to Relational Database Concepts
        d. Basic Mapping: The Transformation Process
        e. Relationship Mapping
        f. Subtype Mapping
    6. DB SQL
        a. SQL Introduction: Querying the Database
        b. Basic Table Modifications
B. Database Programming
    1. Introduction
        a. List the Oracle Database 10g main features
        b. Describe relational and object relational database designs
        c. Review the system development life cycle
        d. Describe different means of storing data
        e. Review the relational database concept
        f. Define the term data models
        g. Show how multiple tables can be related
    2. Retrieving Data Using the SQL SELECT Statement
        a. Define projection, selection, and join terminology
        b. Review the syntaxes for the basic SQL SELECT statements
        c. Use Arithmetic and Concatenation operators in SQL statements
        d. List the differences between SQL and iSQL*Plus
        e. Log into the database using iSQL*Plus
        f. Explain the iSQL*Plus interface
        g. Categorize the different types of iSQL*Plus commands
        h. Save SQL statements to script files
    3. Restricting and Sorting Data
        a. Limit rows using a selection
        b. Using the WHERE clause to retrieve specific rows
        c. Using the comparison conditions in the WHERE clause
        d. Use the LIKE condition to compare literal values
        e. List the logical conditions AND, OR, NOT
        f. Describe the rules of precedence for the conditions shown in this lesson
        g. Sort rows with the ORDER BY clause
        h. Use ampersand substitution in iSQL*Plus to restrict and sort output at run time
    4. Using Single Row Functions to Customize Reports
        a. Show the differences between single row and multiple row SQL functions
        b. Categorize the character functions into case manipulation and character manipulation types
        c. Use the character manipulation functions in the SELECT and WHERE clauses
        d. Explain and use the DATE, conversion, numeric and general functions
        e. Use the SYSDATE function to retrieve the current date in the default format
        f. Introduce the DUAL table as a means to view function results
        g. List the rules for applying the arithmetic operators on dates
        h. Use the arithmetic operators with dates in the SELECT clause
    5. Reporting Aggregated Data Using the Group Functions
        a. Describe and categorize the group functions
        b. Use the group functions
        c. Utilize the DISTINCT, COUNT, and NVL keyword with the group functions
        d. Describe how nulls are handled with the group functions
        e. Create groups of data with the GROUP BY clause
        f. Group data by more than one column
        g. Avoid illegal queries with the group functions
        h. Exclude groups of data with the HAVING clause
    6. Displaying Data From Multiple Tables
        a. Show the join tables syntax using SQL 99 syntax
        b. Explain the Cartesian product and the Join operations
        c. Use table aliases to write shorter code and explicitly identify columns from multiple tables
        d. Issue a SQL CROSS JOIN statement to produce a cartesian product
        e. Use the NATURAL JOIN clause to retrieve data from tables with the same named columns
        f. Create a join with the USING clause to identify specific columns between tables
        g. Create a three way join with the ON clause to retrieve information from 3 tables
        h. List the types of outer joins LEFT, RIGHT, and FULL
        i. Add additional conditions when joining tables with the AND clause
    7. Using the SET Operators
        a. Use the UNION operator to return all rows from multiple tables and eliminate any duplicate rows
        b. Use the UNION ALL operator to return all rows from multiple tables
        c. Describe the INTERSECT operator
        d. Use the INTERSECT operator
        e. Explain the MINUS operator
        f. Use the MINUS operator
        g. List the SET operator guidelines
        h. Order results when using the UNION operator
    8. Manipulating Data

a. Write INSERT statements to add rows to a table
b. Copy rows from another table
c. Create UPDATE statements to change data in a table
d. Generate DELETE statements to remove rows from a table
e. Use a script to manipulate data
f. Save and discard changes to a table through transaction processing
g. Show how read consistency works
h. Describe the TRUNCATE statement
9. Using Subqueries to solve queries
   a. Subquery Overview
   b. Using a Subquery
   c. List the syntax for sub queries in a SELECT statements WHERE clause
   d. List the guidelines for using sub queries
   e. Describe the types of sub queries
   f. Execute single row sub queries and use the group functions in a sub query
   g. Identify illegal statements with sub queries
   h. Execute multiple row sub queries
   i. Analyze how the ANY and ALL operators work in multiple row sub queries
   j. Explain how null values are handled in sub queries
   k. INSERT Statement
   l. Updating Column Values and Deleting Rows
   m. DEFAULT Values and the MERGE Statement
10. Searching Data Using Advanced Sub queries
    a. Subquery Overview
    b. Using a Subquery
    c. Comparing several columns using Multiple-Column Sub queries
    d. Defining a Data source Using a Sub query in the FROM Clause
    e. Returning one Value using Scalar Sub query Expressions
    f. Performing ROW by-row processing with Correlated Sub queries
    g. Reusing query blocks using the WITH Clause
11. Manipulating Data
    a. Write INSERT statements to add rows to a table
    b. Copy rows from another table
    c. Create UPDATE statements to change data in a table
    d. Generate DELETE statements to remove rows from a table
    e. Use a script to manipulate data
    f. Save and discard changes to a table through transaction processing
    g. Show how read consistency works
    h. Describe the TRUNCATE statement
    i. Defining NOT NULL and UNIQUE Constraints
    j. PRIMARY KEY, FOREIGN KEY, and CHECK Constraints
12. Views
    a. Creating Views
    b. DML Operations and Views
    c. Managing Views
    d. Sequences
    e. Indexes and Synonyms
13. Controlling User Access
    a. Creating and Revoking Object Privileges
    b. Controlling user access
    c. System versus objects privileges
    d. Creating user sessions and granting system privileges
    e. Using roles to define user groups
    f. Creating and granting privileges to a role
    g. Granting and revoking object privileges
    h. Changing your password
    i. Using Database Links
14. Using DDL Statements to Create and Manage Tables
    a. List the main database objects and describe the naming rules for database objects
    b. Introduce the schema concept
    c. Display the basic syntax for creating a table and show the DEFAULT option
    d. Explain the different types of constraints
    e. Show resulting exceptions when constraints are violated with DML statements
    f. Create a table with a sub query
    g. Describe the ALTER TABLE functionality
    h. Remove a table with the DROP statement and Rename a table
15. Manipulating Large Data Sets
    a. Using the MERGE Statement
    b. Performing DML with Subqueries
    c. Performing DML with a RETURNING Clause
    d. Overview of Multitable INSERT Statements
    e. Tracking Changes in DML

VI. METHODS OF INSTRUCTION:
   A. **Lecture** -
   B. Classroom discussion
   C. Computer demonstrations with overhead display panel
   D. Discussion boards
   E. Lab experience: hands-on lab assignments and database creation and manipulation
   F. PowerPoint presentations
   G. Chat rooms
   H. Read text and other supplemental sources (example, Internet sites)

VII. TYPICAL ASSIGNMENTS:
   A. Lecture 1. Interests, Aptitudes, and Career Exploration 2. GROUP BY and HAVING clauses B. Reading 1. Read the chapter on Joins and Subqueries 2. Read the U.S. Department of Labor Bureau of Labor Statistics Occupational Outlook Handbook SQL jobs C. Hands-on lab assignment, write the SQL program to: 1. Display for each employee the employee number, last name, salary, and salary increased by 15% and expressed as a whole number. Label the column New Salary

2. Write a query that produces the following for each employee seems monthly but wants . Label the column Dream Salaries. Format the salary to look like $10,000.00 3. Write a query that will return the names and past job Ids for those employees that have previously held roles in their company

VIII. EVALUATION:
    A. **Methods**

        1. Exams/Tests
        2. Quizzes
        3. Class Participation
        4. Lab Activities
        5. Other:
            a. Methods
                1. Quizzes, chapter, midterm and final examination
                2. Graded hands-on lab assignments
                3. Relevant active participation

    B. **Frequency**

        1. Frequency
            a. Chapter quizzes, examinations (mid-term, final)
            b. Weekly hands-on lab assignments to reinforce and demonstrate mastery of the various tools

IX. TYPICAL TEXTS:
    1. Dawes, Chip *OCA/OCP Introduction to Oracle11g SQL Study Guide.*, Sybex, 2009.
    2. Oracle *Oracle iLearning.*, Oracle Corporation Curriculum, 2011.

X. OTHER MATERIALS REQUIRED OF STUDENTS:
    A. Access to the World Wide Web with any major Web browser