Republic of the Philippines

Department of Education

DepEd Complex, Meralco Avenue, Pasig City

STRENGTHENED SENIOR HIGH SCHOOL CURRICULUM

COMPUTER PROGRAMMING
(ORACLE DATABASE)

Grade 11/12

Course Description:

This course focuses on Structured Query Language (SQL) and Programming Language (PL), equipping learners with the essential knowledge and skills needed to build, implement, develop, test, and maintain computer programs while administering databases using Oracle technology. Upon completion, learners are eligible to take assessments to National Certifications level III Programming (Oracle Database), higher education, and careers in the computer programming industry.

Elective: Technical Professional
Prerequisite: None
Time Allotment: In Grade 11, 320 hours for two semesters, 8 hours per week/In Grade 12, 320 hours for one semester, 16 hours per week
Schedule: First/Second Semester

QUARTER 1

CONTENT STANDARD	The learners demonstrate an understanding of concepts and components of database management systems and use of SQL basic syntax for data manipulation.
PERFORMANCE STANDARD	The learners execute basic SQL syntax for data manipulation.

LEARNING COMPETENCIES	**CONTENT**

1. Discuss fundamental concepts and components of Oracle Database system	Fundamental Concepts and Components of the Oracle Database System
	• Historical Context of Oracle Database
	  o overview and milestones of Oracle in database technology
	  o key features and differences among various Oracle versions
	  o career and business opportunities
	• Database Management System (DBMS)
	  o introduction to DBMS and its significance in data management
	  o roles of DBMS database administrator
	  o database

	○ definition ○ types ○ theoretical and physical aspects • RDBMS (Relational Database Management Systems) and ORDBMS (Object-Relational Database Management Systems) ○ definition and features of RDBMS and ORDBMS ○ differences between RDBMS and ORDBMS • The Data Model basic building blocks of database ○ fundamental components ▪ entities ▪ attributes ▪ relationships ○ functions • Database Design ○ overview ○ schema design ○ normalization • File System Data Processing ○ contrast traditional file systems with database systems in terms of data processing ○ problems associated with file systems
2. Discuss installation procedure of IDE for Oracle Database	Installing Oracle Database and setting up the IDE • System requirements • SQL platform selection • Downloading SQL Software • Installing the Command Line Shell or Graphical User Interface (GUI) tools • Running the SQL Executable

3. Construct basic SQL syntax	SQL (Structured Query Language) • Syntax • Basic commands
4. Apply LIMIT rows syntax retrieved by a query	LIMIT rows syntax • WHERE clause • Character strings and dates • Conditional Operators o relational operators (=, >, <, >=, <=, <>) o logical operators (AND, OR, NOT o filtering operators (BETWEEN, IN, LIKE, NULL) o rules of precedence
5. Apply SORT rows syntax retrieved by a query	SORT rows syntax • ORDER BY clause syntax o ascending order o descending order • Sorting by column alias • Sorting by multiple columns
6. Apply single row functions	Single-row functions • Definition • Types • Character functions o case manipulation functions o character manipulation functions • Number functions operators o round o trunc o mod

	• Arithmetic operators with dates
	• Date Functions
	• Conversion Functions
	  o implicit data type
	  o explicit data type
	  o TO_CHAR function
	  o dates
	• Numbers
	  o elements of the Date Format Model
	  o TO_NUMBER functions
	  o TO_DATE functions
	  o RR date format

QUARTER 2

CONTENT STANDARD	The learners demonstrate an understanding of multiple row functions, joins, subqueries, and substitution variables to retrieve and display data from multiple tables.
PERFORMANCE STANDARD	The learners create a database applying multiple row functions, joins, subqueries, and substitution variables to retrieve and display data from multiple tables.

LEARNING COMPETENCIES	**CONTENT**
1. Apply multiple row functions	Multiple Row Functions

	• Aggregate functions syntax
	  ○ group by clause
	  ○ group functions
	  ○ AVG and SUM functions
	  ○ MIN and MAX functions
	  ○ COUNT function
	  ○ distinct keyword
	  ○ group functions and null values
	  ○ creating groups of data
	  ▪ group by clause syntax
	  ▪ grouping by more than one column
	  ▪ group by clause on multiple columns
	  ○ HAVING clause
	  ○ nesting group functions

2. Apply JOIN syntax in retrieving and displaying from multiple tables	Retrieving and Displaying Data from Multiple Tables Using JOIN Syntax
	• Types of joins
	  ○ equijoin
	  ○ non-equijoin
	  ○ outer join
	  ○ self-join
	  ○ cross join
	  ○ inner join
	  ○ natural join
	  ○ left outer join
	  ○ right outer join
	  ○ full outer join
	• Retrieving records with the USING clause
	• Joining more than two tables

	• Joining a table to itself ○ three-way joins with the ON clause syntax • Search conditions using AND operator • Qualifying ambiguous columns names • Table aliases

3. Apply subqueries for complex data retrieval and manipulation	Subqueries of SQL
	• Types
	  ○ single-row subqueries
	  ▪ comparison operators
	  ○ multiple-row subqueries
	  ▪ IN Operators
	  ▪ ANY Operators
	  ▪ ALL Operators
	• Group functions in a subquery
	• Null values in a subquery
	• HAVING clause with subqueries

4. Apply substitution variables in SQL	Substitution variables in SQL
	• Single substitution/ampersand (&)
	  ○ character and date values
	  ○ specifying column names, expressions, and text
	  ○ WHERE condition
	  ○ order by clauses
	  ○ column expressions
	  ○ table names
	  ○ entire select statements

	○ substitution variables ▪ DEFINE command ▪ UNDEFINED command • Double /repeated substitution ampersand (&&) ○ VERIFY command ○ COLUMN command

QUARTER 3

CONTENT STANDARD	The learners demonstrate an understanding of Data Manipulation Language (DML) commands in creating and managing database using constraints, views, database objects, managing user access roles and set operators to combine query results.
PERFORMANCE STANDARD	The learners apply DML commands in creating and managing database using constraints, views, database objects, managing user access roles and set operators to combine query results.

LEARNING COMPETENCIES	CONTENT
1. Apply DML commands in manipulating data for table attributes	**Data Manipulation Language (DML) Command** • Different syntax of DML ○ add ○ insert ▪ null values ▪ date values ○ update ○ delete ○ merge • Database transactions

	○ commit statement ○ rollback statement ○ begin/save point statement
2. Create tables for managing data	**Managing Tables** • Naming conventions • Creating tables • ALTER table statement ○ adding column ○ modifying column ○ dropping column and table ▪ renaming a table ▪ dropping a table ▪ truncating a table ▪ managing indexes ▪ viewing table structure ▪ SET unused option ▪ adding comments
3. Apply constraint commands for data validation	**SQL Constraints** • Key constraints ○ NOT NULL ○ UNIQUE KEY ○ PRIMARY KEY ○ FOREIGN KEY ○ CHECK ○ DEFAULT • Cascading constraints ○ On Delete Cascade ○ On Update ○ On Delete Set Null

	○ On Update Set Null ○ On Delete Set Default ○ On Update Set Default
4. Apply VIEW syntax in accessing specific data	**VIEW syntax** • Using VIEW • Modifying and dropping VIEW • Type ○ simple ○ complex ○ inline ○ materialized ○ updatable ○ read only ○ partitioned
5. Apply database object functions for storing or referencing data	**Database Objects Categories** • Table • Views • Indexes • Stored Procedures • Functions • Triggers • Sequences • Schemas • Synonyms • User Defined Types

6. Apply database control in managing user access	**Managing User Access**
	• Controlling user access
	• Privileges
	  ○ system privileges
	  ○ creating users
	  ○ granting system privileges
	  ○ roles and groups
	  ○ revoking privileges
	  ○ auditing and monitoring

7. Apply SET operators in data manipulation	**SET Operators** • UNION Operator • UNION ALL Operator • INTERSECT Operator • EXCEPT Operator

8. Execute GROUP BY clause commands for data manipulation	**Enhancements to the GROUP BY Clause**
	• Group functions
	• HAVING clause
	• GROUP BY
	  ○ ROLLUP
	  ○ CUBE operators
	• GROUPING function
	• GROUPING sets
	• Composite columns
	• Concatenated groupings

QUARTER 4

CONTENT STANDARD	The learners demonstrate an understanding in connecting programming language (PL) to a SQL database, effectively performing Create, Read, Update and Delete (CRUD) operations.
PERFORMANCE STANDARD	The learners create an application by connecting programming language (PL) to a SQL database, effectively performing Create, Read, Update and Delete (CRUD) operations.

LEARNING COMPETENCIES	**CONTENT**
1. Perform connection of PL to SQL for program application	Introduction to PL/SQL Identifiers • Concept • Types of Identifiers • Variables • Data Types • Sequences • Executable Statements
2. Apply SQL syntax to programming .net or Java for storing or retrieval of data	Interaction with the Oracle Server • SELECT statements in PL/SQL • Data in PL/SQL • Different errors by using naming conventions • SQL cursor attributes
3. Evaluate bugs using exception handling in programming .net or Java for debugging process	Exception Handling • Definition of exception handling • Predefined Oracle server errors • Non-predefined Oracle server errors • User-defined exceptions

4. Apply store procedures on PL/SQL	Store Procedures on PL/SQL • Modularized and layered subprogram design • Development with PL/SQL blocks • PL/SQL execution environment • Benefits of using PL/SQL subprograms • Differences between anonymous blocks and subprograms • Procedure parameters and parameter modes in PL/SQL • Procedure information in PL/SQL
5. Create the PL/SQL code framework	Starting the PL/SQL Code • Predefined data types • Subtypes based on existing types of applications • Collections • Manipulating large objects
6. Apply the advanced interface methods on PL/SQL framework	Advanced Interface Methods • External procedures form • Benefits of external procedures with PL/SQL framework • Java advanced interface

7. Apply performance and tuning using PL/SQL code	Performance and tuning to PL/SQL code • The compiler • PL/SQL code • Intra unit in-lining • Memory and network issues in PL/SQL • Performance with Caching Business Pitching Process (pitching prototype)

GLOSSARY

aggregate functions	sql functions that perform a calculation on a set of values and return a single result some examples include count, avg, sum, max, and min. they are commonly used with group by clauses to summarize data.
attributes	characteristics or properties that describe entities in a database, typically represented as columns in a table an attribute holds data that corresponds to an entity, such as a "name" or "address" for a "person." each attribute has a defined data type.
database	an organized collection of structured data, typically stored electronically in a computer system it can contain multiple tables, views, and other objects. databases are managed by database management systems (dbms) to ensure data integrity and security.

Database Administrator (DBA)	a professional responsible for the installation, configuration, management, and maintenance of a database system they ensure data availability, security, and performance optimization. the dba also handles tasks like backups, updates, and user permissions.
database design	the process of structuring a database logically and physically to meet business needs it involves creating tables, relationships, keys, and constraints to ensure data integrity and efficiency. proper design minimizes redundancy and ensures scalability.
Database Management System (DBMS)	a software system that enables the creation, management, and manipulation of databases it provides an interface for users and applications to interact with the stored data. dbms ensures data consistency, security, and concurrency control.
Data Definition Language (DDL)	a subset of sql used to define, modify, and delete database objects like tables, indexes, and views key ddl commands include create, alter, and drop. ddl statements affect the structure of the database itself.
Data Manipulation Language (DML)	a subset of sql used to manipulate the data within a database it includes commands like select, insert, update, and delete. dml operations interact directly with data stored in tables.

Data Control Language (DCL)	a subset of sql used to control access to data in a database it includes the grant and revoke commands to manage user permissions. dcl ensures that only authorized users can access or modify certain data.
entities	objects or things in the real world that have a distinct existence and can be represented within a database examples include a "customer" or "employee." entities are typically represented as rows in a table.
file system	a method of storing and organizing data in files on a disk or other storage devices while a file system provides basic file storage capabilities, a dbms offers advanced data management features like querying and indexing. file systems are not optimized for large-scale data retrieval or concurrency control.
foreign key	a column or group of columns in a table that creates a relationship between two tables it refers to the primary key of another table to establish referential integrity. foreign keys ensure that data in related tables remains consistent.
function	a named, precompiled block of code that performs a specific task and returns a result in sql, functions can manipulate data, perform calculations, or return modified data based on input arguments. functions are often used in queries or stored procedures.

Graphical User Interface (GUI)	a visual interface that allows users to interact with a computer system through graphical elements like buttons, icons, and menus gui simplifies database management tasks by allowing users to perform actions without writing sql commands. oracle provides a gui-based tool called sql developer for database management.
identifiers	names used to uniquely identify objects in a database, such as tables, columns, or functions identifiers must follow specific naming rules set by the dbms. in oracle, identifiers are case-insensitive unless enclosed in quotes.
JOIN syntax	the syntax used to combine data from two or more tables based on a related column common types of joins include inner join, left join, right join, and full join. joins are essential for retrieving related data from multiple tables in relational databases.
null values	special markers used to represent missing or undefined data in a database a null value does not equal any other value, not even another null. handling null values correctly is important for data integrity and accurate query results.
ORDER BY clause	an sql clause used to sort the result set of a query by one or more columns the order can be ascending (asc) or descending (desc). it helps organize query results in a specific sequence.

primary key	a column or combination of columns in a table that uniquely identifies each row it ensures data integrity by preventing duplicate or null values in the key column(s). every table in a relational database should have a primary key.
privileges	permissions granted to database users that define what actions they can perform on the database objects common privileges include select, insert, update, and delete. privileges can be granted to individual users or roles.
Structured Query Language (SQL)	a standardized programming language used to manage and manipulate relational databases it allows users to define, query, and modify data using statements like select, insert, update, and delete. sql is essential for interacting with relational databases.

REFERENCES

GeeksforGeeks. (2024, August 30). SQL Tutorial. GeeksforGeeks. https://www.geeksforgeeks.org/sql-tutorial/

Oracle Tutorial - Learn Oracle Database from Scratch | OracleTutorial.com. (2021, November 21). Oracle Tutorial. https://www.oracletutorial.com/

Oracle Philippines | Cloud Applications and Cloud Platform. (n.d.). https://www.oracle.com/ph/

Republic of the Philippines & Department of Education. (n.d.). MATATAG CURRICULUM EDUKASYONG PANTAHANAN AT PANGKABUHAYAN (EPP) / TECHNOLOGY AND LIVELIHOOD EDUCATION (TLE) Grades 4 and 7. In Department of Education. https://www.deped.gov.ph/wp-content/uploads/MATATAG-EPP_TLE-CG-Grades-4-and-7.pdf

Technical Education and Skills Development Authority-Qualification Standards Office. Training Regulations for Programming (Oracle Database) NC III. Taguig City, Philippines: TESDA, 2013. https://tesda.gov.ph/Downloadables/TR%20-%20Programming%20(Oracle%20Database)%20NC%20III.pdf

W3Schools.com. (n.d.). https://www.w3schools.com/sql/

MATERIALS, TOOLS, AND EQUIPMENT

TOOLS	EQUIPMENT	MATERIALS
Computer Software e.g. - IDE - Libraries	Network Computer with peripherals	Learning materials/ guide
Internet access	Server	Practice materials
Application servers e.g. - database - web	Printer	Hand-outs
	White board	Reference books
	LCD Projector and screen	
	Ergonomic computer tables and chairs	