# Database Design and Programming with SQL – Course Description

## Overview

This course engages students to analyze complex business scenarios and create a data model—a conceptual representation of an organization's information. Participants implement their database design by creating a physical database using SQL. Basic SQL syntax and the rules for constructing valid SQL statements are reviewed. This course culminates with a project that challenges students to design, implement, and demonstrate a database solution for a business or organization.

## Available Curriculum Languages:

- English, Simplified Chinese, Brazilian Portuguese, Spanish

## Duration

- Recommended total course time:  180 hours*
- Professional education credit hours for educators who complete Oracle Academy training:  60

    *Course time includes instruction, self-study/homework, practices, projects, and assessment*

## Target Audiences

### Educators
- College/university faculty who teach computer programming, information communications technology (ICT), or a related subject
- Secondary school teachers who teach computer programming, ICT, or a related subject

### Students
- Students who wish to learn the techniques and tools to design, guild and extract information from a database
- Students who possess basic mathematical, logical, and analytical problem-solving skills
- Novice programmers, as well as those at advanced levels, to learning the SQL Programming language to an advanced level

## Prerequisites

### Required
- Ease with using a computer
- General knowledge of databases and query activity

### Suggested
- None

## Suggested Next Courses

- Database Programming with PL/SQL

## Lesson-by-Lesson Topics

# Database Design

## Introduction
- Introduction to the Oracle Academy
- Data vs. Information
- History of the Database
- Major Transformations in Computing

## Entities and Attributes
- Conceptual and Physical Models
- Entities, Instances, Attributes, and Identifiers
- Entity Relationship Modeling and ERDs

## Relationship Basics
- Identifying Relationships
- ER Diagramming Conventions
- Speaking ERDish & Drawing Relationships
- Matrix Diagrams

## Super/Sub Types and Business Rules
- Supertypes and Subtypes
- Documenting Business Rules

## Relationship Fundamentals
- Relationship Transferability
- Relationship Types
- Resolving Many-to-Many Relationships
- Understanding CRUD Requirements

## UIDs and Normalization
- Artificial, Composite, and Secondary UIDs
- Normalization and First Normal Form
- Second Normal Form
- Third Normal Form

## Arcs, Hierarchies, and Recursive Modeling
- Arcs
- Hierarchies and Recursive Relationships

## Changes and Historical Modeling
- Modeling Historical Data
- Modeling Change: Time
- Modeling Change: Price
- Drawing Conventions for Readability

## Mapping
- Introduction to Relational Database Concepts
- Basic Mapping: The Transformation Process
- Relationship Mapping
- Subtype Mapping

## Creating Database Projects
- System Development Life Cycle
- Project Overview and Getting Started
- Presentation Project Management
- Final Presentation Components

## Presenting Database Projects
- Creating Tables for the Final Presentation

- Preparing Written Documentation
- Preparing Visual Materials
- Final Presentations

## Database Programming with SQL

### Introduction
- Oracle Application Express
- Relational Database Technology
- Anatomy of a SQL Statement

### SELECT and WHERE
- Columns, Characters, and Rows
- Limit Rows Selected
- Comparison Operators

### WHERE, ORDER BY, and Intro to Functions
- Logical Comparisons and Precedence Rules
- Sorting Rows
- Introduction to Functions

### Single Row Functions Part I
- Case and Character Manipulation
- Number Functions
- Date Functions

### Single Row Functions Part II
- Conversion Functions
- NULL Functions
- Conditional Expressions

### JOINs
- Cross Joins and Natural Joins
- Join Clauses
- Inner versus Outer Joins
- Self-Joins and Hierarchical Queries
- Oracle Equijoin and Cartesian Product
- Oracle Nonequijoins and Outer Joins

### Group Functions
- Group Functions
- Oracle Nonequijoins and Outer Joins
- Using Group By and Having Clauses
- Using Rollup and Cube Operations, and Grouping Sets
- Using Set Operators

### Subqueries
- Fundamentals of Subqueries
- Single-Row Subqueries
- Multiple-Row Subqueries
- Correlated Subqueries

### Ensuring Quality Queries Part I
- Ensuring Quality Query Results

DML
- INSERT Statements
- Updating Column Values and Deleting Rows
- DEFAULT Values, MERGE, and Multi-Table Inserts

DDL
- Creating Tables
- Using Data Types
- Modifying a Table

Constraints
- Intro to Constraints; NOT NULL and UNIQUE Constraints
- PRIMARY KEY, FOREIGN KEY, and CHECK Constraints
- Managing Constraints

Views
- Creating Views
- DML Operations and Views
- Managing Views

Sequences and Synonyms
- Working With Sequences
- Indexes and Synonyms

Privileges and Regular Expressions
- Controlling User Access
- Creating and Revoking Object Privileges
- Regular Expressions

TCL
- Database Transactions

Final Project and Exam Review
- Testing
- Final Project Database Creation
- Final Exam Review

Ensuring Quality Queries Part II
- Ensuring Quality Query Results - Advanced Techniques

To search and register for events scheduled in your area, visit the [Academy events calendar](#).