ADVANCED SQL PROGRAMMING

COURSE
SYLLABUS

TABLE OF CONTENTS

COURSE DETAILS

Duration

30 hours • 8 Modules

Course Description

Based upon the skills learners gained in their previous SQL and Databases course, this course extends the learner's skill in SQL programming and covers topics such as database design, normalization, stored procedures, advanced functions and aggregates, and query optimization. Learners explore best practices for writing clean, efficient, and maintainable SQL code.

Learning Goals

By the end of this course, you will be able to read, write, and maintain more complex SQL queries and be able to read and design database schemas.

Learning Objectives

- Design database schemas using entity-relationship diagramming techniques.
- Normalize database tables for efficient data storage and retrieval.
- Use a variety of advanced functions and features of the SQL language to query and manipulate data.
- Create stored procedures, CTEs, and window functions for aggregating and processing data.
- Apply best practices and optimization techniques when working with SQL and databases.

▎ **REQUIREMENTS**

Course Completion Requirements

- Receive 10 (out of 15) points or above on the course project.
- Receive a 70% average or above on the quizzes.
- Show passion, aptitude, and potential.
- Instructor recommendation
- Attendance of 80% or higher

Software

To complete the course, learners need the following:

- Computer with access to the internet
- Web browser
- MySQL database, installed and operating, and **MySQL Workbench** (graphical user interface for working with MySQL)
- Entity-Relationship Diagramming (ERD) software, such as ***Diagrams.net***, ***SmartDraw***, ***Visio***, or other diagramming software that supports ERD

▎**GRADING**

Assessment Scale

Assessment	Points	% of Grade	# of Assessments	Cumulative Points
Final Project	15	25%	1	15
Quizzes	15	75%	3	45
			Points Possible	**60**

Project Rubrics

Below are the final rubrics that your instructor will use to assess your final project. To pass the final project, you must meet expectations (10/15 points).

Tasks 1 and 2: Database Schemas and Normalization

	0 – No Submission	1 – Does Not Meet Expectations	2 – Meets Expectations	3 – Exceeds Expectations
Task 1: Database Schemas	Learner did not submit the database schema.	Learner was not able to complete the database schema or did so incorrectly.	The learner correctly completed the database schema. One or two minor mistakes were made.	The learner correctly completed the tables in the database schema. No mistakes were made.
Task 2: Normalization	Learner did not submit the table in 3NF form.	Learner was not able to normalize the table into 3NF form.	Learner correctly normalized the table into 3NF form. One or two minor mistakes were made.	Learner correctly normalized the table into 3NF form. No mistakes were made.
			Total:	

Task 3: Cardinality and Degree of Relationship

	0 – No Submission	1 – Does Not Meet Expectations	2 – Meets Expectations	3 – Exceeds Expectations
Accuracy and Completeness: *Did learner answer the question correctly and completely?*	Learner did not submit the data or sufficient information.	The learner described the degree of relationship incorrectly.	The learner made and described the degree of relationship correctly but did not provide any reasoning or gave incorrect reasoning behind the answer.	The learner described the degree of relationship correctly and provided clear, correct reasoning behind the answer.
			Total:	

Task 4: Advanced Stored Procedures

	0 – No Submission	1 – Does Not Meet Expectations	2 – Meets Expectations	3 – Exceeds Expectations
Accuracy and Completeness: *Did the queries produce the correct results? Was the code complete?*	Learner did not submit the produced data.	The learner produced data with incorrect or insufficient information. The code was blank or did not follow correct guidelines.	The learner made an error that resulted in too much or too little information. The code had minor issues resulting in incorrect/unorganized data.	The learner produced correct and accurate results.
			Total:	

Task 5: Encryption

	0 – No Submission	1 – Does Not Meet Expectations	2 – Meets Expectations	3 – Exceeds Expectations
Accuracy and Completeness: *Did learner answer the question correctly and completely?*	Learner did not answer the question.	The learner attempted to answer the question, but the answer was incorrect.	The learner answered the question but not completely.	The learner answered the question and specifically mentioned all elements given in the sample answer.
			Total:	

Final Score

Task	Score	Possible Points
Tasks 1 and 2: Database Schemas and Normalization		6
Task 3: Cardinality and Degree of Relationship		3
Task 4: Advanced Stored Procedures		3
Task 5: Encryption		3
Grand Total (10/15 Needed to Pass)		15

COURSE OVERVIEW

Class Details

#	Module Name	Lessons
01	Advanced Database Design	Conceptual and Logical Diagramming Cardinality and Degree of Relationship Recursive Relationships and Hierarchies
02	Enhanced Database Design	Normalization Mapping Designs to Physical Tables NoSQL
03	Advanced Functions	Cryptographic Hash Functions Complex Joins Window Functions
04	Common Table Expressions (CTEs) and Advanced Querying	Common Table Expressions Advanced Subqueries CAST and CONVERT
05	Transactions and Stored Procedures	Transaction Management and ACID Properties Stored Procedures Using Parameters in Stored Procedures
06	Stored Procedures and Working with Dates and Times	Conditional Statements in Stored Procedures Using Loops in Stored Procedures Working with Dates and Times
07	Debugging and Writing Secure, Readable, and Efficient Code	Working with Legacy Code Navigating Existing Databases Writing Secure, Readable, and Efficient Code
08	Best Practices and Optimization	Best Practices Query Optimization Optimized SQL Syntax

Class Assignments

#	Module Name	To-Dos Before Next Class	Canvas Assignments
8.1.1	Advanced Database Design	Lesson 1 Activity: Conceptual and Logical Diagraming	
8.1.2	Advanced Database Design	Lesson 2 Activity: Cardinality and Degree of Relationship	
8.1.3	Advanced Database Design	Lesson 3 Activity: Recursive Relationships and Hierarchies	
8.2.1	Enhanced Database Design	Lesson 1 Activity: Normalization	
8.2.2	Enhanced Database Design	Lesson 2 Activity: Mapping Designs to Physical Tables	
8.2.3	Enhanced Database Design	Lesson 3 Activity: NoSQL	**Quiz #1**
8.3.1	Advanced Functions	Lesson 1 Activity: Cryptographic Hash Functions	
8.3.2	Advanced Functions	Lesson 2 Activity: Complex JOINs	
8.3.3	Advanced Functions	Lesson 3 Activity: Window Functions	
8.4.1	Common Table Expressions (CTEs) and Advanced Querying	Lesson 1 Activity: Common Table Expressions	
8.4.2	Common Table Expressions (CTEs) and Advanced Querying	Lesson 2 Activity: Advanced Subqueries	
8.4.3	Common Table Expressions (CTEs)	Lesson 3 Activity: CAST and CONVERT	**Quiz #2**

	and Advanced Querying		
8.5.1	Transactions and Stored Procedures	Lesson 1 Activity: Transaction Management and ACID Properties	
8.5.2	Transactions and Stored Procedures	Lesson 2 Activity: Stored Procedures	
8.5.3	Transactions and Stored Procedures	Lesson 3 Activity: Using Parameters in Stored Procedures	
8.6.1	Stored Procedures and Working with Dates and Times	Lesson 1 Activity: Conditional Statements in Stored Procedures	
8.6.2	Stored Procedures and Working with Dates and Times	Lesson 2 Activity: Using Loops in Stored Procedures	
8.6.3	Stored Procedures and Working with Dates and Times	Lesson 3 Activity: Working with Dates and Times	**Quiz #3**
8.7.1	Debugging and Writing Secure, Readable, and Efficient Code	Lesson 1 Activity: Working with Legacy Code Start working on final project.	
8.7.2	Debugging and Writing Secure, Readable, and Efficient Code	Lesson 2 Activity: Navigating Existing Databases	
8.7.3	Debugging and Writing Secure, Readable, and Efficient Code	Lesson 3 Activity: Writing Secure, Readable, and Efficient Code	
8.8.1	Best Practices and Optimization	Lesson 1 Activity: Best Practices Finish and submit final project.	**Assignment**: Submit final project

8.8.2	Best Practices and Optimization	Lesson 2 Activity: Platform Optimization	
8.8.3	Best Practices and Optimization	Lesson 3 Activity: Optimized SQL Syntax	