# Querying Microsoft SQL Server Training

Duration: **5 Day**

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## Overview

This 5-day instructor led course provides delegates with the technical skills required to write basic Transact-SQL queries for Microsoft SQL Server 2014. This course is the foundation for all SQL Server-related disciplines; namely, Database Administration, Database Development and Business Intelligence. This course helps people prepare for exam 70-461.

## Prerequisites

- Working knowledge of relational databases.
- Basic knowledge of the Microsoft Windows operating system and its core functionality.

## Who Should Attend

This course is intended for Database Administrators, Database Developers, and Business Intelligence professionals.

For SQL power users who aren't necessarily database-focused or plan on taking the exam, such as report writers, this course may be too technical and specific learning aims may be better met attending the course

## What You Will Learn

At the end of this course you will be able to:

- Write SELECT queries
- Query multiple tables
- Sort and filter data
- Describe the use of data types in SQL Server
- Modify data using Transact-SQL
- Use built-in functions
- Group and aggregate data
- Use subqueries
- Use table expressions
- Use set operators
- Use window ranking, offset and aggregate functions
- Implement pivoting and grouping sets
- Execute stored procedures
- Program with T-SQL
- Implement error handling
- Implement transactions

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## Outline

**Module 1: Introduction to Microsoft SQL Server 2014**

This module introduces operators that allow data sets to be compared and for a dataset to be used to calculate a subsequent dataset.

**Lessons**

- The Basic Architecture of SQL Server
- SQL Server Editions and Versions
- Getting Started with SQL Server Management Studio

**Lab : Working with SQL Server 2014 Tools**

- Working with SQL Server Management Studio
- Creating and Organizing T-SQL scripts
- Using Books Online

**Module 2: Introduction to T-SQL Querying**

This module introduces Transact SQL as the primary querying language of SQL Server. It discusses the basic structure of T-SQL queries, the logical flow of a SELECT statement, and introduces concepts such as predicates and set-based operations.

**Lessons**

- Introducing T-SQL
- Understanding Sets
- Understanding Predicate Logic
- Understanding the Logical Order of Operations in SELECT statements

**Lab : Introduction to Transact-SQL Querying**

- Executing Basic SELECT Statements
- Executing queries which filter data using predicates
- Executing queries which sort data using ORDER BY

**Module 3: Writing SELECT Queries**

This module introduces the fundamentals of the SELECT statement, focusing on queries against a single table.

**Lessons**

- Writing Simple SELECT Statements
- Eliminating Duplicates with DISTINCT
- Using Column and Table Aliases
- Writing Simple CASE Expressions

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**Lab : Writing Basic SELECT Statements**

- Write simple SELECT Statements
- Eliminate Duplicates Using Distinct
- Use Table and Column Aliases
- Use a Simple CASE Expression

**Module 4: Querying Multiple Tables**

This module explains how to write queries which combine data from multiple sources in SQL Server. The module introduces the use of JOINs in T-SQL queries as a mechanism for retrieving data from multiple tables.

**Lessons**

- Understanding Joins
- Querying with Inner Joins
- Querying with Outer Joins
- Querying with Cross Joins and Self Joins

**Lab : Querying Multiple Tables**

- Writing Queries That Use Inner Joins
- Writing Queries That Use Multiple-Table Inner Join
- Writing Queries That Use Self Joins
- Writing Queries That Use Outer Joins
- Writing Queries That Use Cross Joins

**Module 5: Sorting and Filtering Data**

This module explains how to enhance queries to limit the rows they return, and to control the order in which the rows are displayed. The module also discusses how to resolve missing and unknown results.

**Lessons**

- Sorting Data
- Filtering Data with a WHERE Clause
- Filtering with the TOP and OFFSET-FETCH Options
- Working with Unknown and Missing Values

**Lab : Sorting and Filtering Data**

- Writing Queries That Filter Data Using a WHERE Clause
- Writing Queries That Filter Data Using an ORDER BY Clause
- Writing Queries That Filter Data Using the TOP Option
- Writing Queries That Filter Data Using the OFFSET-FETCH Clause

**Module 6: Working with SQL Server 2014 Data Types**

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This module explains the data types SQL Server uses to store data. It introduces the many types of numeric and special-use data types. It also explains conversions between data types, and the importance of type precedence.

**Lessons**

- Introducing SQL Server 2014 Data Types
- Working with Character Data
- Working with Date and Time Data

**Lab : Working with SQL Server 2014 Data Types**

- Writing Queries That Return Date and Time Data
- Writing Queries That Use Date and Time Functions
- Writing Queries That Return Character Data
- Writing Queries That Use Character Functions

**Module 7: Using DML to Modify Data**

This module describes the use of Transact-SQL Data Manipulation Language to perform inserts, updates, and deletes to your data.

**Lessons**

- Inserting Data
- Modifying and Deleting Data

**Lab : Using DML to Modify Data**

- Inserting Data
- Updating and Deleting Data

**Module 8: Using Built-In Functions**

This module introduces the use of functions that are built in to SQL Server Denali, and will discuss some common usages including data type conversion, testing for logical results and nullability.

**Lessons**

- Writing Queries with Built-In Functions
- Using Conversion Functions
- Using Logical Functions
- Using Functions to Work with NULL

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**Lab : Using Built-In Functions**

- Write queries which use conversion functions
- Write queries which use logical functions
- Write queries which test for nullability

## Module 9: Grouping and Aggregating Data

This module introduces methods for grouping data within a query, aggregating the grouped data and filtering groups with HAVING. The module is designed to help the student grasp why a SELECT clause has restrictions placed upon column naming in the GROUP BY clause as well as which columns may be listed in the SELECT clause.

**Lessons**

- Using Aggregate Functions
- Using the GROUP BY Clause
- Filtering Groups with HAVING

**Lab : Grouping and Aggregating Data**

- Write queries which use the GROUP BY clause
- Write queries which use aggregate functions
- Write queries which use distinct aggregate functions
- Write queries which filter groups with the HAVING clause

## Module 10: Using Subqueries

This module will introduce the use of subqueries in various parts of a SELECT statement. It will include the use of scalar and multi-result subqueries, and the use of the IN and EXISTS operators.

**Lessons**

- Writing Self-Contained Subqueries
- Writing Correlated Subqueries
- Using the EXISTS Predicate with Subqueries

**Lab : Using Subqueries**

- Write queries which use self-contained subqueries
- Write queries which use scalar and multi-result subqueries
- Write queries which use correlated subqueries and EXISTS predicate

## Module 11: Using Table Expressions

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This module introduces T-SQL expressions which return a valid relational table, typically for further use in the query. The module discusses views, derived tables, common table expressions and inline table-valued functions.

**Lessons**

- Using Derived Tables
- Using Common Table Expressions
- Using Views
- Using Inline Table-Valued Functions

**Lab : Using Table Expressions**

- Write Queries Which Use Views
- Write Queries Which Use Derived Tables
- Write Queries Which Use Common Table Expressions
- Write Queries Which Use Inline Table-Valued Functions

**Module 12: Using Set Operators**

This module introduces the set operators UNION, INTERSECT, and EXCEPT to compare rows between two input sets.

**Lessons**

- Writing Queries with the UNION Operator
- Using EXCEPT and INTERSECT
- Using APPLY

**Lab : Using Set Operators**

- Write queries which use UNION set operators and UNION ALL multi-set operators
- Write queries which use CROSS APPLY and OUTER APPLY operators
- Write queries which use EXCEPT and INTERSECT operators

**Module 13: Using Window Ranking, Offset, and Aggregate Functions**

This module introduces window functions including ranking, aggregate and offset functions. Much of this functionality is new to SQL Server 2012. It will cover the use of T-SQL functions such as ROW_NUMBER, RANK, DENSE_RANK, NTILE, LAG, LEAD, FIRST_VALUE and LAST_VALUE to perform calculations against a set, or window, of rows.

**Lessons**

- Creating Windows with OVER

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- Exploring Window Functions

**Lab : Using Window Ranking, Offset and Aggregate Functions**

- Write queries which use ranking functions
- Write queries which use offset functions
- Write queries which use window aggregate functions

**Module 14: Pivoting and Grouping Sets**

This module discusses techniques for pivoting data in T-SQL as well to introduce the fundamentals of the GROUPING SETS clause. It will also cover the use of GROUP BY ROLLUP and GROUP BY CUBE syntax in SQL Server.

**Lessons**

- Writing Queries with PIVOT and UNPIVOT
- Working with Grouping Sets

**Lab : Pivoting and Grouping Sets**

- Write queries which use the PIVOT operator
- Write queries which use the UNPIVOT operator
- Write queries which use the GROUPING SETS subclause

**Module 15: Executing Stored Procedures**

This module introduces the use of existing stored procedures in a T-SQL querying environment. It discusses the use of EXECUTE, how to pass input and output parameters to a procedure, and how to invoke system stored procedures.

**Lessons**

- Querying Data with Stored Procedures
- Passing Parameters to Stored Procedures
- Creating Simple Stored Procedures
- Working with Dynamic SQL

**Lab : Executing Stored Procedures**

- Use the EXECUTE statement to invoke stored procedures
- Pass parameters to stored procedures
- Execute system stored procedures

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## Module 16: Programming with T-SQL

This module provides a basic introduction to T-SQL programming concepts and objects. It discusses batches, variables, control of flow elements such as loops and conditionals, how to create and execute dynamic SQL statements, and how to use synonyms.

**Lessons**

- T-SQL Programming Elements
- Controlling Program Flow

**Lab : Programming with T-SQL**

- Declaring Variables and Delimiting Batches
- Using Control-of-Flow Elements
- Generating Dynamic SQL
- Using Synonyms

## Module 17: Implementing Error Handling

This module introduces the use of error handlers in T-SQL code. It will introduce the difference between compile errors and run-time errors, and will cover how errors affect batches. The module will also cover how to control error handling using TRY/CATCH blocks, the use of the ERROR class of functions, and the use of the new THROW statement.

**Lessons**

- Using TRY / CATCH Blocks
- Working with Error Information

**Lab : Implementing Error Handling**

- Redirecting Errors with TRY / CATCH
- Using THROW to Pass an Error Message Back to a Client

## Module 18: Implementing Transactions

This module introduces the concepts of transaction management in SQL Server. It will provide a high-level overview of transaction properties, cover the basics of marking transactions with BEGIN, COMMIT and ROLLBACK.

**Lessons**

- Transactions and the Database Engine

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- Controlling Transactions
- Isolation Levels

**Lab : Implementing Transactions**

- Controlling transactions with BEGIN, COMMIT, and ROLLBACK
- Adding error handling to a CATCH block

**Module 19: Improving Query Performance**

**Lessons**

- Factors in Query Performance
- Displaying Query Performance Data

**Module 20: Querying SQL Server Metadata**

**Lessons**

- Querying System Catalog Views and Functions
- Executing System Stored Procedures
- Querying Dynamic Management Objects