

Querying Microsoft SQL Server 2025

Course Description:

This intensive 5-day instructor-led course is designed to teach participants how to query and manipulate data in Microsoft SQL Server 2025 using Transact-SQL (T-SQL). The course covers foundational to advanced querying concepts, enabling learners to efficiently retrieve, group, filter, and modify data, as well as work with functions, subqueries, transactions, and performance considerations. With hands-on labs and real-world examples, this course prepares participants for both professional database querying tasks and Microsoft certification exams.

Duration:

5 Days (40 Hours – Theory, Demos, and Labs)

Pre-requisites:

Participants should have:

- Basic familiarity with relational databases and data concepts.
- Understanding of fundamental programming or scripting logic.
- Prior exposure to Windows operating systems and command-line tools.
- (Optional) Some experience with Excel or other data tools.

Learning Objectives:

By the end of this course, participants will be able to:

- Understand SQL Server architecture and the role of T-SQL.
- Write complex SELECT statements to retrieve data efficiently.
- Filter, sort, and aggregate data using advanced T-SQL constructs.
- Join multiple tables and use subqueries effectively.

- Implement data modification and work with transactions.
- Apply built-in functions and handle data types.
- Use windowing, pivoting, and set operations.
- Implement error handling, variables, and procedural constructs.
- Optimize queries and interpret execution plans.

Content Coverage

Module 1: Introduction to SQL Server and T-SQL

- Overview of SQL Server 2025 architecture and editions
- Understanding databases, schemas, and objects
- Introduction to Transact-SQL (T-SQL)
- Connecting to SQL Server using SSMS and Azure Data Studio
- Understanding batches, scripts, and comments
- Introduction to sample databases used in labs

Module 2: Basics of Querying Data

- Structure of a SELECT statement
- Query execution order and logical processing phases
- Retrieving specific columns and using column aliases
- Using DISTINCT and filtering duplicates
- Using TOP and OFFSET-FETCH clauses

Module 3: Sorting and Filtering Data

- Using ORDER BY for sorting result sets
- Filtering rows with WHERE and logical operators
- Using comparison, BETWEEN, IN, and LIKE filters

- Handling NULLs with IS NULL and IS NOT NULL
- Combining filters with OR, AND, and NOT

Module 4: Querying Multiple Tables with Joins

- Understanding relationships and foreign keys
- INNER, LEFT, RIGHT, and FULL OUTER joins
- CROSS JOIN and self joins
- Join conditions and table aliases
- Applying joins for data analysis scenarios

Module 5: Using Subqueries

- Introduction to subqueries and nesting
- Scalar, multi-valued, and correlated subqueries
- Using EXISTS and NOT EXISTS
- Comparing subqueries and joins
- Lab practice: Filtering and aggregating with subqueries

Module 6: Working with Built-in Functions

- Scalar vs aggregate functions
- String functions (LEN, REPLACE, SUBSTRING, etc.)
- Date and time functions
- Mathematical and conversion functions
- NULL-handling and system functions

Module 7: Aggregating and Grouping Data

- Using GROUP BY and HAVING clauses

- Built-in aggregate functions (SUM, AVG, COUNT, etc.)
- Grouping sets, ROLLUP, and CUBE
- Filtering grouped data
- Understanding grouping combinations and summary tables

Module 8: Data Modification Statements

- Inserting new records with INSERT
- Updating rows with UPDATE
- Deleting data with DELETE
- Using MERGE for upserts
- Managing transactions during data modification

Module 9: Working with Data Types and Expressions

- SQL Server 2025 data types overview
- Implicit and explicit conversions
- Working with numeric, string, and temporal data
- Using expressions and computed columns
- Handling data truncation and rounding

Module 10: Using Set Operators

- Understanding UNION, UNION ALL, INTERSECT, and EXCEPT
- Combining and filtering data across queries
- Handling column and data type mismatches
- Sorting combined results
- Practical examples of set-based comparisons

Module 11: Working with Variables and Batches

- Declaring and assigning variables
- Understanding batch execution and GO statements
- Using PRINT and SELECT for debugging
- System-defined variables such as @@IDENTITY and @@ROWCOUNT
- Controlling flow between statements

Module 12: Implementing Control-of-Flow Constructs

- Using IF...ELSE statements
- Implementing WHILE loops
- Managing GOTO and BREAK statements
- Using WAITFOR and RETURN
- Script modularization with BEGIN...END

Module 13: Working with Temporary Tables and Table Variables

- Creating temporary tables
- Using table variables for inline storage
- Comparing temporary tables and table variables
- Managing scope and cleanup
- Performance considerations for temporary structures

Module 14: Working with Views

- Understanding virtual tables (views)
- Creating and altering views
- Using views for data abstraction and security
- Indexed and schema-bound views

- Restricting data access through views

Module 15: Implementing Error Handling

- Using TRY...CATCH blocks
- Retrieving error information with ERROR functions
- Handling transaction rollbacks
- Best practices for fault-tolerant T-SQL scripts
- Logging and rethrowing errors

Module 16: Using Window Functions

- Understanding OVER and PARTITION BY
- Ranking functions (ROW_NUMBER, RANK, DENSE_RANK)
- Aggregate window functions
- Running totals and moving averages
- Combining window functions with common table expressions

Module 17: Query Optimization and Execution Plans

- Understanding query processing architecture
- Reading and interpreting execution plans
- Identifying costly operations (scans vs. seeks)
- Using indexes for optimization
- Applying query hints cautiously

Module 18: Working with Common Table Expressions (CTEs)

- Basics of CTEs and advantages over subqueries
- Recursive and non-recursive CTEs

- Managing hierarchical data
- Combining CTEs with windowing and aggregation
- Real-world CTE design patterns

Optional Add-on Module: Using JSON and XML in SQL Server

- Introduction to JSON support in SQL Server 2025
- Parsing and querying JSON data
- FOR JSON and OPENJSON functions
- XML data type and XQuery basics
- Integrating semi-structured data with T-SQL