

KOENIG SOLUTIONS • COURSE OUTLINE

Querying Microsoft SQL Server 2025

Learn to write and optimise Transact-SQL queries in SQL Server 2025, from joins and subqueries to window functions and execution plans.

5 Days

40 HOURS

19

MODULES

95

TOPICS

1

HANDS-ON ACTIVITIES

40 hours – Theory, Demos, and Labs

COURSE OVERVIEW

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.

WHO THIS COURSE IS FOR

Database Administrators

Database Developers

Business Intelligence Developers

Data Analysts

Application Developers

Report Writers

PREREQUISITES

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.

What You Will Learn

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

COURSE SYLLABUS

19 Modules, 95 Topics

01

Introduction to SQL Server and T-SQL

TOPICS

- 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

02

Basics of Querying Data

TOPICS

- 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

03

Sorting and Filtering Data

TOPICS

- 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

04

Querying Multiple Tables with Joins

TOPICS

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

05

Using Subqueries

TOPICS

- 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

06

Working with Built-in Functions

TOPICS

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

07

Aggregating and Grouping Data

TOPICS

- 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

08

Data Modification Statements

TOPICS

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

09

Working with Data Types and Expressions

TOPICS

- 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

10

Using Set Operators

TOPICS

- 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

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Working with Variables and Batches

TOPICS

- 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

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Implementing Control-of-Flow Constructs

TOPICS

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

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Working with Temporary Tables and Table Variables

TOPICS

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

14

Working with Views

TOPICS

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

15

Implementing Error Handling

TOPICS

- 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

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Using Window Functions

TOPICS

- 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

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Query Optimization and Execution Plans

TOPICS

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

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Working with Common Table Expressions (CTEs)

TOPICS

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

TOPICS

- 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

WHAT IS INCLUDED

Everything You Need to Succeed

- Koenig course material for every module
- Hands-on exercises throughout the course
- Delivery by certified instructors and subject matter experts
- Course completion certificate from Koenig

ABOUT KOENIG

Who We Are

Established in 1993, Koenig Solutions is a globally recognised training provider with 35+ technology partnerships, 5,000+ training programmes and a network of certified instructors and subject matter experts, supporting individuals and enterprise teams worldwide.

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