

# Microsoft SQL Server 2025: Enterprise Database Administration

## Microsoft SQL Server 2025: Enterprise Database Administration (40 Hours)

Empower your database team with practical expertise in **SQL Server 2025 administration, security, migration, and automation**. This intensive 40-hour program is designed for enterprise DBAs, data platform engineers, and IT professionals responsible for managing critical on-premises and cloud SQL Server environments.

Participants will gain **hands-on experience** with core administration tasks, including installation, configuration, backup and recovery, storage and file management, and operational monitoring. Advanced modules cover **modern SQL Server 2025 capabilities** such as JSON data types, REST integrations, vector data.

The program also emphasizes **enterprise-ready automation and migration strategies**, leveraging **SQL Server PowerShell, SSMA, and Visual Studio Code with MSSQL extension**, ensuring repeatable, secure, and efficient workflows.

Through **practical labs simulating real-world enterprise scenarios**, attendees will be equipped to manage, secure, and optimize SQL Server environments, improve operational excellence, and drive business continuity.

---

### Day 1: Core DB Architecture, Installation & Environment Setup

#### Module 1: Introduction & DBA Fundamentals

- Lesson 1.1: Role of DBA & SQL Server 2025 overview
- Lesson 1.2: SQL Server 2025 Instance Architecture & Services
- Lesson 1.3: SQL Server Memory & Process Model
- **Lab 1:** Explore SQL Server components and system databases

#### Module 2: Hardware & Storage Planning

- Lesson 2.1: CPU, Memory & Storage sizing best practices
- Lesson 2.2: RAID, IOPS, Tempdb planning
- Lesson 2.3: Auto-growth, Instant File Initialization
- **Lab 2:** Plan and configure storage for sample database

### **Module 3: Installation & Configuration**

- Lesson 3.1: SQL Server 2025 Installation Workflow
- Lesson 3.2: Service Accounts & Instance Configuration
- Lesson 3.3: Post-installation Checklist & Validation
- **Lab 3:** Install SQL Server 2025 on a test VM

### **Module 4: Authentication & Access Control**

- Lesson 4.1: Authenticating Connections to SQL Server
- Lesson 4.2: Authorizing Logins to Connect to Databases
- Lesson 4.3: Authorization Across Servers
- Lesson 4.4: Partially Contained Databases
- **Lab 4:** Configure users and authentication

### **Business Problem & Its Solutions**

- Failed installation due to permissions/port conflicts
  - Memory allocation issues at startup
  - Tempdb bottlenecks from incorrect sizing
  - Collation mismatches causing errors
- 

## **Day 2: Security, Identity, Roles & Auditing**

### **Module 5: Security Fundamentals**

- Lesson 5.1: SQL Server Security Architecture
- Lesson 5.2: Managed Identities & Credential Management
- Lesson 5.3: Password Policy Enforcement & Secure Config
- Lesson 5.4: Enhanced Password Protection
- **Lab 5:** Configure security policies on a test instance

### **Module 6: Role-Based Access Control**

- Lesson 6.1: SQL Server Login & Database User
- Lesson 6.2: Server Roles Overview
- Lesson 6.2: Fixed Database Roles
- Lesson 6.3: User-Defined Database Roles
- **Lab 6:** Assign server and database roles to users

## **Module 7: Auditing & Encryption**

- Lesson 7.1: Options for Auditing Data Access
- Lesson 7.2: Implementing SQL Server Audit
- Lesson 7.3: Managing Audit Data
- Lesson 7.4: Protecting Data with Encryption (TDE, Backup, Column-level)
- **Lab 7:** Configure auditing and encryption

## **Module 8: Governance & Compliance**

- Lesson 8.1: Least Privilege Design
- Lesson 8.2: Audit Retention & Compliance Framework
- Lesson 8.3: Security Baselines & Documentation

## **Business Problem & Its Solutions**

- Unauthorized access due to misconfigured roles
  - Failed audit logs
  - Encryption key mismanagement causing restore failures
  - Permissions drift across servers
- 

## **Day 3: Backup, Restore & Recovery**

### **Module 9: Backup Architecture**

- Lesson 9.1: Full, Differential & Log Backups
- Lesson 9.2: Encrypted Backups & Compression
- Lesson 9.3: File/Filegroup-level Backups
- ZSTD compression algorithm introduced in SQL Server 2025
- **Lab 9:** Implement backup strategy on a test database

### **Module 10: Restore & Recovery Operations**

- Lesson 10.1: Restore Sequences & Validation
- Lesson 10.2: Point-in-Time Recovery
- Lesson 10.3: Page & Piecemeal Restore
- **Lab 10:** Perform backup restore scenarios

### **Module 11: Backup Strategy Governance**

- Lesson 11.1: Scheduling & Automation
- Lesson 11.2: Storage Allocation & Repository Management

- Lesson 11.3: Monitoring & Reporting
- **Lab 11:** Configure automated backup jobs

#### **Module 12: Server-Level Operational Continuity**

- Lesson 12.1: System DB Recovery (master, msdb, model)
- Lesson 12.2: Document Recovery Procedures
- **Lab 12:** Simulate recovery of system DBs

#### **Business Problem & Its Solutions**

- Failed backup jobs due to permissions or disk space
  - Restore failures caused by missing log backups
  - Corrupted backup files or incomplete recovery
- 

### **Day 4: Storage, File Management & Administrative Operations**

#### **Module 13: Database Storage & File Architecture**

- Lesson 13.1: Data & Log Files
- Lesson 13.2: Filegroups & Storage Tiering
- Lesson 13.3: VLF Management & Auto-growth
- **Lab 13:** Configure filegroups and data files

#### **Module 14: Tempdb Administration**

- Lesson 14.1: Multi-file Configuration & Initialization
- Lesson 14.2: Preventing Allocation Bottlenecks
- **Lab 14:** Configure tempdb for optimal admin setup

#### **Module 15: Maintenance Automation**

- Lesson 15.1: DBCC CHECKDB & Consistency Checks
- Lesson 15.2: Statistics Lifecycle Management
- Lesson 15.3: Index Maintenance (Admin Perspective)
- Lesson 15.4: SQL Server Agent Jobs & Multi-server Admin
- **Lab 15:** Configure automated maintenance jobs

#### **Module 16: Operational Monitoring**

- Lesson 16.1: Health Checks & System Monitoring
- Lesson 16.2: Storage Growth & File Monitoring
- Lesson 16.3: Backup & Log Usage Monitoring

- **Lab 16:** Monitor server health & storage trends

### **Business Problem & Its Solutions**

- Log file growth exceeding disk space
  - Tempdb contention blocking sessions
  - Missed or failed maintenance jobs
  - Filegroup fragmentation affecting operations
- 

## **Day 5: Upgrades, Modern Features, Governance & Automation**

### **Module 17: Patch Management & Upgrades**

- Lesson 17.1: Upgrade Planning & Patch Strategy
- Lesson 17.2: In-place / Side-by-side Upgrade Methods
- Lesson 17.3: Compatibility Levels & Testing
- **Lab 17:** Apply cumulative update or upgrade a test SQL Server instance

### **Module 18: Governance, Documentation & Data Lifecycle**

- Lesson 18.1: Policy-Based Management
- Lesson 18.2: Data Retention & Archival
- Lesson 18.3: Access Governance & Documentation Templates
- **Lab 18:** Document DBA policies and runbooks

### **Module 19: SQL Server 2025 Modern Data Capabilities**

- Lesson 19.1: JSON Data Type & Indexing
- Lesson 19.2: REST API Calls via T-SQL
- Lesson 19.3: RegEx T-SQL Functions
- Lesson 19.4: Vector Data Administration
- **Lab 19:** Configure JSON column, run REST query, and manage vector data

### **Module 20: Automation, Scripting & Runbook Design**

- Lesson 20.1: Introduction to SQL Server PowerShell cmdlets & T-SQL Automation
- Lesson 20.2: Job Orchestration & Scheduling
- Lesson 20.3: Automating routine DBA tasks (backups, monitoring, maintenance)
- **Lab 20:** Automate routine DBA operations

### **Business Problem & Its Solutions**

- Upgrade failures due to compatibility issues

- Mismanaged automation jobs causing downtime
- Governance lapses leading to compliance issues
- Security misconfigurations on new SQL Server 2025 features

## **Module 21: Modern SQL Server 2025 Migration & Automation Tools**

### **Lesson 21.1: MSSQL Extension for Visual Studio Code**

- Overview of VS Code as a lightweight SQL editor
- T-SQL script development with IntelliSense
- SQL Database Projects for version-controlled schema

### **Lesson 21.2: SQL Server Migration Assistant (SSMA)**

- Schema and data migration workflow: Assessment → Conversion → Migration → Validation
- post-migration validation and troubleshooting

### **Lab 21: End-to-End Migration & Automation Exercise**

- Connect to SQL Server using VS Code MSSQL extension
- Perform schema conversion and data migration with SSMA
- Validate migrated database and check schema consistency