

**Microsoft SQL Server 2008 R2 DBA – Course Syllabus**

**1. Introduction (32 hours)**

**a. Course Introduction (1 hour)**

**b. Introduction to Databases (3 hours)**

- 1) Databases – Relational and Others (0.5 hour)
- 2) SQL Server vs. Other Relational Database Systems (0.5 hour)
- 3) The Database as Part of the System Architecture (0.5 hour)
- 4) The Role of the Database Administrator (DBA) (1 hour)
- 5) Review & Summary (0.5 hour)
- Homework (2.5 hours)

**c. Introduction to Microsoft SQL Server (4 hours)**

- 1) SQL Server Versions and Editions (0.5 hour)
- 2) SQL Server 2008 R2 Services and Components (1 hour)
- 3) SQL Server 2008 R2 Client Tools (1.5 hours)
- 4) Practice (0.5 hour)
- 5) Review & Summary (0.5 hour)
- Homework (3.5 hours)

**d. Database Design (8 hours)**

- 1) Entity-Relationship Diagram (ERD) (0.5 hour)
- 2) Entities, Attributes & Keys (0.5 hour)
- 3) Types of Relationships (1 hour)
- 4) Inheritance (0.5 hour)
- 5) Normalization Rules (0.5 hour)
- 6) Denormalization Scenarios (0.5 hour)
- 7) The Physical Design Process (0.5 hour)
- 8) Types of Tables (0.5 hour)
- 9) Practice (2.5 hours)
- 10) Review & Summary (1 hour)
- Homework (7 hours)

**e. Introduction to the Transact-SQL Language (4 hours)**

- 1) SQL vs. Transact-SQL (0.5 hour)
- 2) Types of Transact-SQL Statements (0.5 hour)
- 3) Transact-SQL Syntax Elements (0.5 hour)
- 4) System Functions and System Stored Procedures (0.5 hour)
- 5) Connections, Sessions, Batches and Transactions (0.5 hour)
- 6) Practice (1 hour)

- 7) Review & Summary (0.5 hour)
  - Homework (3.5 hours)
  - f. Programming Basics (4 hours)**
    - 1) Working with Variables (0.5 hour)
    - 2) Conditional Statements (1 hour)
    - 3) Error Handling (1 hour)
    - 4) Practice (1 hour)
    - 5) Review & Summary (0.5 hour)
    - Homework (3.5 hours)
  - g. System Infrastructures Overview (6.5 hours)**
    - 1) Operating System Basics (1.5 hours)
    - 2) Active Directory Fundamentals (0.5 hour)
    - 3) Introduction to Storage (2 hours)
    - 4) Introduction to Networking (0.5 hour)
    - 5) Practice (1 hour)
    - 6) Review & Summary (1 hour)
    - Homework (5.5 hours)
  - h. Exam – Introduction (1.5 hours)**
- 2. Basic Programming with Transact-SQL (44 hours)**
- a. The SELECT Statement (8 hours)**
    - 1) A Simple Query (0.5 hour)
    - 2) Formatting the Result Set (0.5 hour)
    - 3) Filtering the Data (1 hour)
    - 4) Grouping and Sorting (1 hour)
    - 5) Joining Multiple Tables (2 hours)
    - 6) Practice (2 hours)
    - 7) Review & Summary (1 hour)
    - Homework (7 hours)
  - b. Advanced Querying (12 hours)**
    - 1) The CASE Clause (0.5 hour)
    - 2) Combining Multiple Result Sets (0.5 hour)
    - 3) Using Sub-Queries (2 hours)
    - 4) Ranking and Partitioning Functions (1.5 hours)
    - 5) Using PIVOT and UNPIVOT (1 hour)
    - 6) Common Table Expressions (2.5 hours)
    - 7) Practice (2.5 hours)

- 8) Review & Summary (1.5 hours)
  - Homework (10.5 hours)
  - c. Modifying Data (8 hours)**
    - 1) Inserting Data (1.5 hours)
    - 2) The UPDATE Statement (1.5 hours)
    - 3) Deleting Data (0.5 hour)
    - 4) The MERGE Statement (1 hour)
    - 5) Using the OUTPUT Clause (0.5 hour)
    - 6) Practice (2 hours)
    - 7) Review & Summary (1 hour)
    - Homework (7 hours)
  - d. Transactions and Locks (8 hours)**
    - 1) Transactions Overview (0.5 hour)
    - 2) Lock Types (0.5 hour)
    - 3) Concurrency Issues (0.5 hour)
    - 4) Transaction Isolation Levels (1 hour)
    - 5) Locking Hints (1 hour)
    - 6) Deadlocks (1 hour)
    - 7) Nesting Transactions (1 hour)
    - 8) Practice (1.5 hours)
    - 9) Review & Summary (1 hour)
    - Homework (7 hours)
  - e. Writing Procedural Code with Transact-SQL (6.5 hours)**
    - 1) Working with Cursors (2 hours)
    - 2) Dynamic Execution (2 hours)
    - 3) Practice (1.5 hours)
    - 4) Review & Summary (1 hour)
    - Homework (5.5 hours)
  - f. Exam – Basic Programming with Transact-SQL (1.5 hours)**
- 3. SQL Server Object Hierarchy (44 hours)**
- a. Installing a SQL Server 2008 R2 Instance (4 hours)**
    - 1) Preparing to Install SQL Server 2008 R2 (0.5 hour)
    - 2) Upgrade Considerations (0.5 hour)
    - 3) The Installation Process (1 hour)
    - 4) Configuring the Instance (0.5 hour)
    - 5) Practice (1 hour)

- 6) Review & Summary (0.5 hour)
- Homework (3.5 hours)

**b. All about Databases (8 hours)**

- 1) Overview of System Databases (0.5 hour)
- 2) Filegroups and Files (1 hour)
- 3) Introducing the Transaction Log (0.5 hour)
- 4) Database Configuration Options (1 hour)
- 5) Creating a Database (0.5 hour)
- 6) Database Maintenance Tasks (0.5 hour)
- 7) Database Snapshots (0.5 hour)
- 8) Schemas and Database Objects (0.5 hour)
- 9) Practice (2 hours)
- 10) Review & Summary (1 hour)
- Homework (7 hours)

**c. All about Tables (12 hours)**

- 1) System Tables and System Views (0.5 hour)
- 2) System Data Types in SQL Server 2008 R2 (1 hour)
- 3) The Use of NULL (0.5 hour)
- 4) Creating a Table (0.5 hour)
- 5) Special Data Types (1 hour)
- 6) User-Defined Data Types (0.5 hour)
- 7) Table @Variables vs. #Temporary Tables (1 hour)
- 8) Table Types (0.5 hour)
- 9) Sparse Columns (0.5 hour)
- 10) Using FILESTREAM (1 hour)
- 11) Working with Spatial Data (0.5 hour)
- 12) Data Compression (0.5 hour)
- 13) Practice (2.5 hours)
- 14) Review & Summary (1.5 hours)
- Homework (10.5 hours)

**d. Indexes and Statistics (8 hours)**

- 1) Introduction to Indexes (0.5 hour)
- 2) Physical Structures (1 hour)
- 3) Special Types of Indexes (0.5 hour)
- 4) Creating an Index (0.5 hour)
- 5) Guidelines for Planning Indexes (0.5 hour)
- 6) The Database Engine Tuning Advisor (0.5 hour)

- 7) Introducing Statistics (1 hour)
- 8) Understanding Execution Plans (0.5 hour)
- 9) Index and Statistics Maintenance (0.5 hour)
- 10) Practice (1.5 hour)
- 11) Review & Summary (1 hour)
- Homework (7 hours)

**e. Table Constraints (4 hours)**

- 1) Data Integrity Overview (0.5 hour)
- 2) Primary Key and Unique Constraint (0.5 hour)
- 3) Foreign Key (0.5 hour)
- 4) Check and Default Constraints (0.5 hour)
- 5) Creating and Disabling Constraints (0.5 hour)
- 6) Practice (1 hour)
- 7) Review & Summary (0.5 hour)
- Homework (3.5 hours)

**f. Partitioning (6.5 hours)**

- 1) Introduction to Partitioning (0.5 hour)
- 2) Partitioning Setup (1 hour)
- 3) Operations on a Partitioned Table (1 hour)
- 4) Partitioned Indexes (0.5 hour)
- 5) Special Guidelines (0.5 hour)
- 6) Practice (2 hours)
- 7) Review & Summary (1 hour)
- Homework (5.5 hours)

**g. Exam – SQL Server Object Hierarchy (1.5 hours)**

**4. Advanced Programming in SQL Server 2008 R2 (36 hours)**

**a. Views (4 hours)**

- 1) Introduction to Views (0.5 hour)
- 2) Modifying Data through a View (0.5 hour)
- 3) Indexed Views (0.5 hour)
- 4) Partitioned Views (1 hour)
- 5) Practice (1 hour)
- 6) Review & Summary (0.5 hour)
- Homework (3.5 hours)

**b. User-Defined Functions (4 hours)**

- 1) Introduction to User-Defined Functions (0.5 hour)

- 2) Scalar Functions (0.5 hour)
  - 3) Table-Valued Functions (0.5 hour)
  - 4) Joining with APPLY (0.5 hour)
  - 5) Practice (1.5 hour)
  - 6) Review & Summary (0.5 hour)
  - Homework (3.5 hours)
- c. Stored Procedures (4 hours)**
- 1) Introduction to Stored Procedures (0.5 hour)
  - 2) Stored Procedure Interfaces (0.5 hour)
  - 3) Creating and Executing Stored Procedures (0.5 hour)
  - 4) Compilation Sequence (0.5 hour)
  - 5) Practice (1.5 hour)
  - 6) Review & Summary (0.5 hour)
  - Homework (3.5 hours)
- d. Triggers (4 hours)**
- 1) Introduction to Triggers (0.5 hour)
  - 2) Creating a Trigger (0.5 hour)
  - 3) Nested and Recursive Triggers (0.5 hour)
  - 4) Scenarios for Using Triggers (0.5 hour)
  - 5) Practice (1.5 hours)
  - 6) Review & Summary (0.5 hour)
  - Homework (3.5 hours)
- e. XML (8 hours)**
- 1) Introduction to XML (0.5 hour)
  - 2) XPath and XQuery (0.5 hour)
  - 3) The XML System Data Type (1 hour)
  - 4) XML Schema Collections (0.5 hour)
  - 5) XML Indexes (0.5 hour)
  - 6) Converting Relational Data to XML (1 hour)
  - 7) Converting XML to Relational Data (1 hour)
  - 8) Practice (2 hours)
  - 9) Review & Summary (1 hour)
  - Homework (7 hours)
- f. Programming on Multiple Instances (4 hours)**
- 1) Using Linked Servers (1 hour)
  - 2) The OPENROWSET Function (0.5 hour)
  - 3) The OPENQUERY Function (0.5 hour)

- 4) Distributed Transactions (1 hour)
- 5) Practice (0.5 hour)
- 6) Review & Summary (0.5 hour)
- Homework (3.5 hours)

**g. Advanced Programming Technologies (6.5 hours)**

- 1) Introduction to CLR (0.5 hour)
- 2) Importing Assemblies into the Database (0.5 hour)
- 3) Creating Managed Database Objects (1 hour)
- 4) Introduction to SMO (1.5 hour)
- 5) Introduction to PowerShell (1 hour)
- 6) Practice (1 hour)
- 7) Review & Summary (1 hour)
- Homework (5.5 hours)

**h. Exam – Advanced Programming in SQL Server 2008 R2 (1.5 hours)**

**5. Managing a SQL Server Environment (40 hours)**

**a. Backup and Recovery (8 hours)**

- 1) Backup Types (1 hour)
- 2) Database Recovery Models (0.5 hour)
- 3) Understanding the Recovery Process (0.5 hour)
- 4) The Restore Operation (0.5 hour)
- 5) Performing Online Restore Operations (0.5 hour)
- 6) Recovering from Database Snapshot (0.5 hour)
- 7) Recovering System Databases (0.5 hour)
- 8) Planning a Backup Strategy (1 hour)
- 9) Practice (2 hours)
- 10) Review & Summary (1 hour)
- Homework (7 hours)

**b. SQL Server 2008 R2 Security (8 hours)**

- 1) SQL Server Security Overview (0.5 hour)
- 2) Authentication Modes (0.5 hour)
- 3) Principals and Securables (1 hour)
- 4) Managing Permissions (1 hour)
- 5) Understanding Ownership Chaining (0.5 hour)
- 6) Controlling Execution Context (0.5 hour)
- 7) SQL Server Auditing (1 hour)
- 8) Practice (2 hours)

- 9) Review & Summary (1 hour)
- Homework (7 hours)
- c. Keys and Certificates (4 hours)**
  - 1) Introduction to Encryption (0.5 hour)
  - 2) Managing Keys and Certificates (0.5 hour)
  - 3) Encrypting and Decrypting Data (0.5 hour)
  - 4) Transparent Data Encryption (0.5 hour)
  - 5) Signing Modules (0.5 hour)
  - 6) Practice (1 hour)
  - 7) Review & Summary (0.5 hour)
  - Homework (3.5 hours)
- d. Automation in SQL Server 2008 R2 (8 hours)**
  - 1) Introduction to SQL Server Agent (0.5 hour)
  - 2) Configuring Database Mail (0.5 hour)
  - 3) Implementing Operators, Jobs and Alerts (1 hour)
  - 4) SQL Server Agent Security (0.5 hour)
  - 5) Using Maintenance Plans (1 hour)
  - 6) Policy-Based Management (1 hour)
  - 7) Managing Multiple Instances (0.5 hour)
  - 8) Performance Data Collection (0.5 hour)
  - 9) Practice (1.5 hours)
  - 10) Review & Summary (1 hour)
  - Homework (7 hours)
- e. Monitoring and Troubleshooting (10.5 hours)**
  - 1) Planning a Monitoring Strategy (0.5 hour)
  - 2) Windows and SQL Server Logs (0.5 hour)
  - 3) Working with Windows Performance Monitor (0.5 hour)
  - 4) The Activity Monitor (0.5 hour)
  - 5) Working with Dynamic Management Objects (1 hour)
  - 6) Using SQL Server Profiler (1 hour)
  - 7) DDL Triggers and Event Notifications (1 hour)
  - 8) Extended Events (1 hour)
  - 9) The Dedicated Administrator Connection (0.5 hour)
  - 10) Resource Governor (0.5 hour)
  - 11) Practice (2 hours)
  - 12) Review & Summary (1.5 hours)
  - Homework (9 hours)



**f. Exam – Managing a SQL Server Environment (1.5 hours)**

**6. Availability and Scalability Solutions (28 hours)**

**a. Using a Standby Server (8 hours)**

- 1) Introduction to High Availability (0.5 hour)
- 2) Failover Clustering (1 hour)
- 3) Log Shipping (1.5 hours)
- 4) Database Mirroring (1.5 hours)
- 5) Monitoring and Troubleshooting (0.5 hour)
- 6) Practice (2 hours)
- 7) Review & Summary (1 hour)
- Homework (7 hours)

**b. Implementing Replication (8 hours)**

- 1) Overview of Replication (0.5 hour)
- 2) Implementing Snapshot Replication (0.5 hour)
- 3) Implementing Transactional Replication (1 hour)
- 4) Implementing Merge Replication (1 hour)
- 5) Implementing Peer-to-Peer Replication (1 hour)
- 6) Replication Topologies (0.5 hour)
- 7) Monitoring and Troubleshooting (0.5 hour)
- 8) Practice (2 hours)
- 9) Review & Summary (1 hour)
- Homework (7 hours)

**c. Transferring Data with SQL Server 2008 R2 (10.5 hours)**

- 1) Data Transfer Scenarios (0.5 hour)
- 2) Using the Import and Export Wizard (0.5 hour)
- 3) Performing Bulk Operations (1 hour)
- 4) The Copy Database Wizard (0.5 hour)
- 5) Introducing SQL Server Integration Services (2 hours)
- 6) Change Data Capture (1 hour)
- 7) Change Tracking (1 hour)
- 8) Practice (2.5 hours)
- 9) Review & Summary (1.5 hours)
- Homework (9 hours)

**d. Exam – Availability and Scalability Solutions (1.5 hours)**

**7. Other Platforms (12 hours)**

- a. Full-Text Search (4 hours)**
    - 1) Introduction to Full-Text Search (0.5 hour)
    - 2) Full-Text Search Architecture (0.5 hour)
    - 3) Querying Using Full-Text Search (1 hour)
    - 4) Full-Text Search Administration (0.5 hour)
    - 5) Practice (1 hour)
    - 6) Review & Summary (0.5 hour)
    - Homework (3.5 hours)
  - b. Reporting Services (4 hours)**
    - 1) Basic Architecture (0.5 hour)
    - 2) Installation and Configuration (0.5 hour)
    - 3) Creating and Deploying Reports (1 hour)
    - 4) Management and Automation (0.5 hour)
    - 5) Practice (1 hour)
    - 6) Review & Summary (0.5 hour)
    - Homework (3.5 hours)
  - c. Service Broker (1.5 hours)**
    - 1) Service Broker Architecture (0.5 hour)
    - 2) Setting Up a Service Broker Solution (0.5 hour)
    - 3) Review & Summary (0.5 hour)
    - Homework (1 hour)
  - d. Exam – Other Platforms (1.5 hours)**
- 8. Summary (4 hours)**
- a. Course Summary (1.5 hours)**
  - b. Summary Project (2.5 hours)**