MTA Database Administrator Fundamentals
Course

Session 1

Section A: Database Tables
- Tables
- Representing Data with Tables
- SQL Server Management Studio

Section B: Database Relationships
- Flat File Databases
- Relational Databases
- RDBMS Benefits
- Related Tables
- Review
- Recursive Relationships
- M:N Relationships

Section C: Understanding DML
- Structured Query Language
- DDL/DML
- Data Control Language

Section D: Database Data Types
- Data Types
- Choosing a Data Type
- SQL Data Types
- Integers
- Exact Numbers
- Money Data Types
- Exceeding Data Type Limits
- Approximate Numerics
- Character Data Types
- Variable vs. Fixed
- Dates and Times
- Numeric and Alphabetic Date Formats
- DateTime2(n)
- ISO 8601 Format
- DateTimeOffset(n)

Section E: Creating and Manipulating Tables
- Table Types
- Simple Syntax
- NULL or NOT NULL
- Creating a Table
- Adding Columns using ALTER TABLE
- Adding Columns with Default Values
- Changing Columns using ALTER TABLE
- UNIQUE Constraints
- Adding UNIQUE Constraints

**Section F: Selecting Data**
- SELECT Statement
- Performing a SELECT
- Selecting Data using Expressions
- Specifying Column Order and Aliases
- Special Character Considerations
- Using Operators and Expressions
- Schema Defined
- Character Operators
- Arithmetic Expressions
- Using Table Aliases

**Section G: Filtering Data using Comparisons**
- WHERE Clauses
- Comparison Operators
- Logical Operators
- Using WHERE Clauses
- Using Comparison Operators
- Combining using AND
- Combining using OR and NOT

**Session 2**

**Section A: Filtering Data using Lists and Ranges**
- Range of Values
- Selecting a Range of Values
- Selecting Values in a List

**Section B: Filtering Data using Pattern Matching**
- Understanding String Pattern Matching
- String Comparison Operators
- Using LIKE Operators
- Percent (%) Wildcards
- Underscore (_) Wildcards
- Braces ([ ]) Wildcards

**Section C: Filtering Data with NULLs**
- NULLs Defined
- NULL Handling

**Section D: Selecting Data using Functions**
- Aggregate Function Types

**Section E: Sorting Data**
- Sorting Data with ORDER BY
• Ordinal Column Position
• Using ORDER BY
• ORDER BY Ordinal Column Position

Section F: Working with Duplicates

• Eliminating Duplicates
• Using DISTINCT

Section G: Joining Data

• Introduction to JOINs
• JOIN Process
• INNER JOIN
• INNER JOIN Example
• Joining Data with Table Aliases
• INNER JOIN with DISTINCT

Section H: OUTER and CROSS JOINs

• OUTER JOIN Defined
• OUTER JOIN Example
• FULL OUTER JOIN Example
• CROSS JOIN Defined
• CROSS JOIN Example

Section I: Combining and Limiting Result Sets

• UNIONs
• UNION ALL vs. UNION
• UNION Correct Syntax
• Limiting Rows using TOPN
• INTERSECT Defined
• EXCEPT Defined
• INTERSECT and EXCEPT Example

Session 3

Section A: Adding Data

• Inserting Data
• INSERT Example
• Inserting Multiple Rows
• Inserting Partial Values

Section B: Updating and Deleting Data

• Updating Data
• UPDATE Example
• Updating Multiple Rows and Columns
• UPDATE Example Continued
• Deleting Data
• DELETE Example
• Deleting Data using Subqueries
• Understanding Transactions
• Creating and Committing a Transaction
Section C: Working with Views

- View Defined
- View Types
- Standard Views
- CREATE VIEW Example
- Using a View to Rename Columns
- Filtering Data with Views
- Creating Views Graphically

Section D: Stored Procedures and Functions

- Stored Procedures Defined
- SP Parameters and Best Practices
- CREATE PROC Example
- Late Binding
- Using Parameters with Stored Procedures
- Built-in vs. User-Defined Functions
- Function Parameters
- Sample Scalar Function Syntax
- Proper Function Body Syntax
- Calling Scalar Functions
- Table-Valued Functions
- Scalar Function Example

Section E: Data Normalization

- Database Design Phases
- Understanding Database Normalization
- Design Problems
- Row INSERT Anomalies
- DELETE Anomalies
- UPDATE Anomalies

Section F: First Normal Form

- Overview of Normal Forms
- First Normal Form Rules
- First Normal Form Example 1
- Candidate Keys Defined
- Primary Keys Defined
- Non-Prime Attributes Defined
- First Normal Form Example 2
- First Normal Form Anomalies

Section G: Second and Third Normal Forms

- Functional Dependency Defined
- Second Normal Form Rules
- Second Normal Form Example
- Second Normal Form Rules Continued
- Transitive Dependencies
- Third Normal Form

Section H: Fourth and Fifth Normal Forms
Session 4

Section A: Primary, Foreign, and Composite Keys

- Primary Keys Defined
- Foreign Keys
- Composite Keys
- Creating a Table with a Primary Key

Section B: Clustered Indexes

- Overview
- Indexes Improve Table Scans
- Seek
- Clustered Index Benefits
- Data Storage Considerations
- Clustered Index on a Heap Table

Section C: Non-Clustered Indexes

- Non-Clustered Index Basics
- Non-Clustered Index on a Heap Table
- Non-Clustered Index Benefits
- Index Creation
- Dropping an Index
- Non-Indexed Table Execution Plan
- Indexed Table Execution Plan

Section D: Database Security Concepts

- SQL Security Steps
- Fixed Server Roles
- Permissions Hierarchy
- Adding Database Users
- Special Database Users
- Permissions
- Database Roles
- Creating a Role
- Role Usage

Section E: Database Backup and Restore

- SQL Backup Methods
- Backup Rights and Permissions
- Backing Up to Disk
- Backup Frequency Considerations
- Full Backups
- Full Backup Syntax
- Restore vs. Recovery
- Automatic Recovery
- Performing a Full Backup
- Backup with Compression
• Restore Types
• Restore Process
• Simple Restore

Section F: Incremental Backups

• Incremental Backup Usage
• Incremental Backups Defined
• Normal Log Backup
• Backup Log Options
• Restoring the Log
• Transaction Log Backup Example
• Transaction Log Restore Example