Foundations of SQL and Python for Data Engineering

Course Description

This 4-day program introduces participants to the **core concepts of SQL and Python**, building a strong foundation for data querying, manipulation, and automation. The course blends theory with hands-on practice, ensuring learners gain practical skills in database operations and programming constructs. By the end, participants will be equipped with the essential knowledge required to transition into advanced topics such as Microsoft Fabric.

Duration

4 Days

Pre-requisites

- Basic computer literacy
- Familiarity with spreadsheets or tabular data
- No prior programming or SQL experience required

Learning Objectives

Participants will be able to:

- **Understand relational databases** and SQL fundamentals
- **Write SQL queries** for data retrieval and manipulation
- **Apply joins and aggregations** to analyze datasets
- **Use Python basics** for scripting and automation
- **Work with data structures** in Python
- **Integrate SQL with Python** for end-to-end workflows
- **Prepare for Microsoft Fabric** by mastering foundational skills

Day-wise Module Coverage

Day 1 – SQL Foundations

Module 1: Introduction to Databases

- Relational vs non-relational databases
- Tables, rows, and columns

- Primary keys and foreign keys
- Data types in SQL
- Understanding schemas and normalization

Module 2: Basic SQL Queries

- SELECT statements
- Filtering with WHERE
- Sorting with ORDER BY
- Using DISTINCT
- Simple expressions in queries

Module 3: Data Retrieval & Filtering

- Comparison operators
- Logical operators (AND, OR, NOT)
- BETWEEN, IN, LIKE
- Handling NULL values
- Basic query optimization

Day 2 – SQL Intermediate Concepts

Module 4: Aggregations & Grouping

- COUNT, SUM, AVG, MIN, MAX
- GROUP BY clause
- HAVING clause
- Nested aggregations
- Practical reporting queries

Module 5: Joins & Relationships

- INNER JOIN
- LEFT/RIGHT JOIN

- FULL OUTER JOIN
- Self-joins
- Combining multiple tables

Module 6: Data Modification

- INSERT statements
- UPDATE statements
- DELETE statements
- Transactions and COMMIT/ROLLBACK
- Constraints and referential integrity

Day 3 – Python Foundations

Module 7: Python Basics

- Introduction to Python syntax
- Variables and data types
- Operators and expressions
- Input and output functions
- Writing and running scripts

Module 8: Control Flow

- Conditional statements (if, elif, else)
- Loops (for, while)
- Break and continue
- Iteration patterns
- Error handling basics

Module 9: Data Structures in Python

- Lists and tuples
- Dictionaries and sets

- Indexing and slicing
- Nested structures
- Practical use cases

Day 4 – Python for Data & SQL Integration

Module 10: Functions & Modules

- Defining functions
- Parameters and return values
- Importing modules
- Built-in libraries overview
- Writing reusable code

Module 11: Working with Data

- Reading and writing files
- String manipulation
- Handling CSV and JSON
- Basic data cleaning
- Introduction to Pandas

Module 12: SQL with Python

- Connecting Python to databases
- Executing SQL queries in Python
- Fetching and processing results