Applied Data Analytics with Excel, SQL, Power BI and Python

Course Duration: 5 Days (40 hours)

Course Description

This comprehensive 5-day training program equips professionals with end-to-end data analytics capabilities across multiple platforms and tools. Participants will master Excel for data preparation and analysis, SQL for database querying and data extraction, Power BI for interactive visualization and business intelligence dashboarding, and Python for advanced data analysis and automation. The course progresses from fundamental concepts to intermediate-level proficiency, enabling participants to work with real-world datasets and deliver actionable business insights. Each module builds progressively with hands-on exercises, practical case studies, and project-based learning to ensure immediate applicability in professional environments.

Prerequisites

Participants should have the following foundational knowledge and experience before attending this course:

- Basic understanding of data concepts and business analytics principles
- Familiarity with Windows or Mac operating system navigation
- Intermediate proficiency with Microsoft Excel (comfortable with basic formulas, formatting, and data entry)

- Understanding of database concepts and basic database terminology
- Familiarity with programming concepts or algorithm logic (beneficial but not mandatory)
- Access to required software: Microsoft Excel (2019 or later), SQL Server Management Studio or equivalent SQL client, Power BI Desktop, Python 3.x with libraries (Pandas, NumPy, Matplotlib), and a text editor or IDE
- Stable internet connectivity for downloading tools, datasets, and resources

Learning Objectives

By the end of this 5-day training program, participants will be able to:

- Perform advanced data cleaning, transformation, and preparation using Excel functions and Power Query
- Write efficient SQL queries to extract, filter, aggregate, and join data from relational databases
- Build interactive and dynamic dashboards in Power BI with advanced visualizations and drill-down capabilities
- Develop Python scripts for data analysis, automation, and statistical computations
- Apply ETL (Extract, Transform, Load) principles across multiple tools for end-to-end data workflows
- Combine insights from Excel, SQL, Power BI, and Python to create comprehensive business analytics solutions
- Implement best practices in data governance, quality assurance, and documentation

- Create reproducible analytics workflows and automation scripts
- Present data-driven insights through professional dashboards and reports
- Troubleshoot common issues and optimize performance across all tools

Content Coverage

Module 1: Data Analytics Fundamentals and Toolkit Setup

- Introduction to data analytics and its business applications
- Understanding the analytics workflow: data collection, preparation, analysis, and visualization
- Overview of Excel, SQL, Power BI, and Python in the analytics ecosystem
- Software installation and configuration (Excel, SQL client, Power BI Desktop, Python environment)
- Workspace setup and best practices for project management
- Data types, data quality, and common data integrity issues
- Introduction to datasets and working with sample data

Module 2: Excel Data Preparation and Cleaning

- Advanced Excel functions: VLOOKUP, INDEX-MATCH, nested functions, and array formulas
- Data validation and error handling techniques
- Using Find and Replace with regular expressions for bulk data cleaning
- Power Query fundamentals for data transformation

- Removing duplicates, handling missing values, and standardizing data formats
- Splitting and combining text data across columns
- Creating lookup tables and reference data management

Module 3: Excel Data Analysis and Summarization

- Pivot tables: creation, configuration, and advanced filtering
- Creating calculated fields and custom aggregations in pivot tables
- Data summarization using SUMIF, AVERAGEIF, and conditional functions
- What-if analysis and scenario planning using Data Tables
- Goal Seek and Solver for optimization problems
- Time-based analysis and trend calculations
- Statistical analysis functions: STDEV, VARIANCE, PERCENTILE, and quartile analysis

Module 4: Excel Visualization and Reporting

- Chart types and selecting appropriate visualizations for data
- Creating and customizing charts: column, line, scatter, and combination charts
- Sparklines and conditional formatting for visual data analysis
- Creating interactive reports with slicers and filters
- Dashboard design principles for Excel
- Linking charts to data filters for dynamic dashboards

- Exporting and formatting reports for stakeholder presentation

Module 5: Introduction to SQL and Database Concepts

- Relational database fundamentals and schema design
- Understanding tables, keys, relationships, and normalization concepts
- SQL Server Management Studio navigation and database exploration
- Writing and executing basic SELECT queries
- WHERE clause, filtering operators, and logical operators
- ORDER BY and LIMIT clauses for result management
- Working with NULL values and data type conversions

Module 6: SQL Data Retrieval and Filtering

- Advanced WHERE clause conditions: IN, BETWEEN, LIKE, and wildcard patterns
- DISTINCT to identify unique values
- Aggregate functions: COUNT, SUM, AVG, MIN, MAX
- GROUP BY and HAVING clauses for grouped aggregations
- Filtering groups with multiple conditions
- Date functions for temporal filtering and calculations
- CASE statements for conditional logic in queries

Module 7: SQL Joins and Data Combination

- INNER JOIN for related data across tables

- LEFT JOIN, RIGHT JOIN, and FULL OUTER JOIN concepts
- Self-joins for hierarchical and comparative analysis
- Multiple join scenarios in complex queries
- Join performance considerations and optimization
- Combining result sets with UNION and UNION ALL
- Cross joins and Cartesian products in specific use cases

Module 8: SQL Subqueries and Advanced Retrieval

- Scalar subqueries in SELECT and WHERE clauses
- Correlated subqueries for row-by-row comparisons
- Subqueries in FROM clause for derived tables
- EXISTS and NOT EXISTS for existence checks
- Common Table Expressions (CTEs) with WITH clause
- Window functions: ROW_NUMBER, RANK, DENSE_RANK, and partitioning
- Running totals and moving averages using window functions

Module 9: Power BI Fundamentals and Data Connectivity

- Power BI Desktop environment: ribbon, panes, and navigation
- Data source connectivity: Excel, SQL Server, CSV, and other formats
- Power Query Editor for ETL operations
- Data type settings and column profiling
- Creating relationships between tables and managing data model

- Star schema design principles for analytics
- Loading data into Power BI and refresh settings

Module 10: Power BI Data Modeling and DAX Basics

- Creating calculated columns using DAX expressions
- Measures and aggregations for report-level calculations
- Using variables in DAX for complex calculations
- Row-level security (RLS) fundamentals
- Hierarchies: date hierarchies and custom hierarchies
- Formatting and display customization
- Best practices in data model optimization

Module 11: Power BI Visualizations and Dashboard Design

- Building basic visuals: tables, matrices, charts, and KPI cards
- Advanced visualizations: gauge charts, scatter plots, funnel charts, and decomposition trees
- Slicers, filters, and buttons for interactivity
- Conditional formatting and visual hierarchy
- Creating drill-through and drill-down capabilities
- Combination charts and multi-page dashboards
- Dashboard layout, design principles, and user experience optimization

Module 12: Power BI Reports and Publishing

- Creating professional multi-page reports with consistent branding
- Bookmarks for report navigation and state management
- Analytics pane for trend analysis and anomaly detection
- Tooltips and cross-filtering between visuals
- Report performance optimization and visual best practices
- Publishing to Power BI Service and workspace management
- Sharing reports and setting permission levels

Module 13: Python Fundamentals for Data Analytics

- Python environment setup and package management (pip, conda)
- Python syntax: variables, data types, operators, and control structures
- Working with lists, dictionaries, tuples, and sets
- String manipulation and text processing
- Functions, modules, and libraries for data analytics
- Handling errors and debugging techniques
- Introduction to data science libraries: Pandas, NumPy, Matplotlib

Module 14: Python Data Analysis with Pandas and NumPy

- Creating and manipulating DataFrames using Pandas
- Data indexing, selection, and slicing operations

- Data cleaning: handling missing values, duplicates, and outliers
- Groupby operations for aggregation and transformation
- Merging and concatenating data from multiple sources
- Pivot tables and reshaping data in Python
- NumPy arrays for numerical computations and mathematical operations

Module 15: Python Data Visualization and Integration

- Creating plots with Matplotlib: line charts, histograms, scatter plots, and box plots
- Customizing visualizations: labels, legends, colors, and styles
- Subplots and multi-chart dashboards using Matplotlib
- Introduction to Seaborn for statistical visualizations
- Exporting visualizations and generating reports
- Integrating Python analytics with Excel and Power BI workflows
- Automation scripts for ETL processes and scheduled analytics tasks