Critical Path Training Course Description

Power BI Master Class

Best Practices in Data Analysis and Reporting

Course Code	PBIMC
Audience	Business Users, Data Analysts and Technical Specialists
Format	Self-paced Training
Length	24 Hours
Course Description	**Power BI Master Class** is an intensive, hands-on training class designed for people who already have experience with Power BI Desktop and the Power BI Service and are ready to move their Power BI builder skills to the next level. Students will learn best practices for extracting data using advanced queries and dataflows, building data models with DAX and creating visualizations using reports ad dashboards. This course has also been designed to prepare student to pass Microsoft Certification **Exam DA-100: Analyzing Data with Microsoft Power BI**. All the essential Power BI concepts and techniques discussed in lectures are reinforced through hands-on lab exercises in which students will move through the actual steps required to build dataflows as well as data models that are deployed as shared datasets. Students will also learn how to design interactive reports using slicers, bookmarks and drillthrough pages. The course discusses essential differences between reports and dashboards and also examines the strengths and weaknesses between imported datasets and DirectQuery datasets. This course discusses distributing Power BI content and administrating the Power BI environment at the tenant-level. Students will learn when and how to install an on-premises data gateway to provide connectivity to on-premises data sources such as SQL Server. The course demonstrates how to configure tenant-level settings for Power BI and how to monitor report and dashboard usage within an organization using Power BI audit logs. Along the way, students will learn how to configure row-level security (RLS) and how to leverage the R data analytics platform to extend a Power BI Desktop project using R script visuals.
Student Prerequisites	Due to the accelerated nature of this training class, it is recommended that students have 6 months or more experience working with the Power BI Service and Power BI Desktop. All students will require a Windows PC running Windows 10, Windows 8.1 or Windows 7 to complete the lab exercises for this course.

Course Modules

1. **Designing Advanced Queries with Power BI Desktop**
2. **Extracting and Preparing Data using Dataflows**
3. **Designing a Data Model with Power BI Desktop**
4. **Writing Advanced DAX Expressions**
5. **Publishing and Managing Datasets**
6. **Designing Interactive Reports in Power BI Desktop**
7. **Designing Dashboards in the Power BI Service**
8. **Distributing Content using App Workspaces**
9. **Administrating and Configuring Security in Power BI**
10. **Introduction to R with Power BI**

Module 01: Designing Advanced Queries with Power BI Desktop

This module examines advanced techniques for extracting and preparing data using the Power Query tools in Power BI Desktop. Students will learn how to create combining queries using merge operations and append operations. Students will then be introduced to writing query logic using M code expressions in the Advanced Editor. The module explains how to optimize query performance using query folding as well as how to use best practices in larger projects such as designing with query composition and structuring queries into folder groups. Along the way, students will learn how to write reusable logic in M code using function queries and how to create a query to indicate when the hosting dataset was lasted updated.

Topics Covered

- Course Introduction
- Importing Data using Power Query
- Writing Query Logic in M
- Understanding Query Folding
- Writing Reusable Function Queries

Hands-on Lab: Creating Advanced Queries with Power BI Desktop

- Exercise 1: Download the Student Lab Files to a Local Folder
- Exercise 2: Sign Up for an Office 365 E5 Trial
- Exercise 3: Sign into the Power BI Service
- Exercise 4: Extract Customer Data using the Web Connector
- Exercise 5: Merge Sales Region Columns into the Customers Table
- Exercise 6: Appending the Output of Multiple Queries to Create the Sales Table
- Exercise 7: Creating a Table using M Code to Sort Sales Regions
- Exercise 8: Creating a Table with M Code to Track the Last Dataset Update
- Exercise 9: Creating a Custom Column to Calculate Customer Age
- Exercise 10: Creating a Reusable Function Query to Clean Text Values

Module 02: Extracting and Preparing Data using Dataflows

This module introduces students to Power BI Dataflows and explains their underlying architecture. The module teaches students how dataflows are built using a browser-based Power Query experience as well as how they are consumed using Power BI Desktop. The module explains the importance of designing a dataflow using a star schema. Students will learn how to import and export dataflows using a JSON file format as well as how to leverage Premium Dataflow features such as linked entities, computed entities and AI features that make it possible to detect sentiment, tag images and extract key phrases.

Topics Covered

- Understanding Dataflow Architecture
- Creating and Consuming Dataflows
- Creating a Star Schema
- Importing and Exporting Dataflows
- Using Premium Dataflow Features

Hands-on Lab: Designing Dataflows to Extract and Transform Data

- Exercise 1: Use Power Query to Create a New Dataflow
- Exercise 2: Extend the Dataflow by Adding Entities for Products and Sales
- Exercise 3: Importing Dataflow Entity Data with Power BI Desktop

Module 03: Designing a Data Model with Power BI Desktop

This module explains the technical details of creating table relationships and the best practices for writing maintainable DAX expressions for calculated columns and measures. Student will learn best practices in writing DAX expressions including using variables and using formatting to improve readability and maintainability. The module demonstrates how to create dynamic lookup tables using DAX, how to create dimensional hierarchies and how to configure the data category for geographical data columns to facilitate mapping data to countries, states, cities and zip codes.

Topics Covered

- Creating Table Relationships
- Creating Calculated Columns and Measure
- Creating Tables using DAX Expressions
- Configuring Fields for Geographic Mapping

Hands-on Lab: Designing a Data Model in Power BI Desktop

- Exercise 1: Configure Table Relationships
- Exercise 2: Create Calculated Columns using DAX
- Exercise 3: Create a Dynamic Lookup Table using DAX
- Exercise 4: Create Measures using DAX
- Exercise 5: Configure Geolocation Columns using Data Categories

Module 04: Writing Advanced DAX Expressions

This module includes an in-depth examination of the DAX evaluation context and explains how row context and filter context affect the way you write advanced DAX expressions. Students will learn when and how to use the CALCULATE function to manipulate the current filter context. Students will also learn how to extend a data model with a custom calendar table and how to leverage the Time Intelligence support in DAX to analyze data in a variety of time dimensions. By the end of this modules, students will know how to write contextually-aware DAX expressions and how to implement a measure that calculates the top 5 products.

Topics Covered

- Creating Dimensional Hierarchies
- Understanding Evaluation Context and Calculate
- Creating a Calendar Table
- Calling DAX Time Intelligence Functions
- Writing Contextually-aware DAX Expressions
- Calculating the Top 5 Products

Hands-on Lab: Writing Advanced DAX Expressions

- Exercise 1: Extend the Data Model using Dimensional Hierarchies
- Exercise 2: Extend the Data Model with a Custom Calendar Table
- Exercise 3: Create Measures using DAX Time Intelligence Functions
- Exercise 4: Create the Top 5 Products Report

Module 05: Publishing and Managing Datasets

This module examines the strengths and weaknesses of imported datasets vs. DirectQuery datasets. Students will learn how to configure data source credentials and how to refresh imported datasets on demand or in a scheduled fashion in the Power BI Service. The module discusses managing connectivity to on-premises data sources such as SQL Server and explains which scenarios require you to install and configure an on-premises data gateway. The module explains the advantages and limitations of using DirectQuery mode when creating a Power BI Desktop project.

Topics Covered

- Comparing Imported Datasets to DirectQuery
- Managing Dataset Refresh
- Installing and Configuring On-premises Gateway
- Designing Datasets using DirectQuery Mode

Hands-on Lab: Working with Data Refresh, Gateways and DirectQuery

- Exercise 1: Configure Data Source Credentials in the Power BI Service
- Exercise 2: Create a Schedule to Automatically Refresh a Dataset
- Exercise 3: Connect to a Data Source using DirectQuery Mode

Module 06: Designing Interactive Reports in Power BI Desktop

This module teaches students how to design interactive reports in Power BI Desktop using slicers, visual highlighting and drill actions. The module explains how to use bookmarks and drillthrough pages to design Power BI reports with interactive navigation and filtering capabilities. The module demonstrates importing custom visuals and designing reports using Phone Layout view. The module examines how report themes can be used to provide a consistent style and branding across multiple reports. The module also discusses the PBIX project publishing process and how it differs when publishing to the Power BI Service versus publishing to Power BI Report Server. The module concludes with an examination of using the Publish to Web feature and the Publish to SharePoint feature with a report that has already been published to the Power BI Service.

Topics Covered

- Working with the Report Designer
- Designing Interactive Reports using Slicers
- Using Conditional Formatting
- Designing Reports using Bookmarks
- Importing Custom Visuals
- Using Custom Report Themes
- Publishing Power BI Reports
- Creating Reports from Shared Datasets

Hands-on Lab: Designing Interactive Reports in Power BI Desktop

- Exercise 1: Publish, Promote and Certify the Wingtip Sales Model Dataset
- Exercise 2: Create a Report on a Published Dataset
- Exercise 3: Create the Top 10 Customers Report
- Exercise 4: Create a Drillthrough Page to Display Customer Details

Module 07: Designing Dashboards in the Power BI Service

The module teaches students the fundamentals of designing dashboards and examines the strengths and limitations of dashboards when compared to Power BI reports. Students will learn how to create and execute natural language queries and how to pin natural language query results to create dashboard tiles. The module demonstrates using Phone Layout view in the Power BI Service to customize the rendering of dashboards when viewed using mobile devices. Student will learn how to configure data alerts on dashboard tiles as well as how to leverage dashboard sharing as a simple mechanism to share dashboards and their underlying reports with other users. The module concludes with an examination of creating real-time dashboards and a discussion of when to use streaming datasets versus push datasets versus hybrid datasets.

Topics Covered

- Designing Dashboards for Power BI
- Executing Queries with Natural Language Q&A
- Sharing Dashboards
- Building Real-time Dashboards

Hands-on Lab: Creating Dashboards in the Power BI Service

- Exercise 1: Create the Wingtip Sales Analysis Dashboard
- Exercise 2: Create the Power BI Training Dashboard
- Exercise 3: Create the Q&A Discovery Dashboard
- Exercise 4: Share the Wingtip Sales Analysis Dashboard

Module 08: Distributing Content using App Workspaces

The module examines the best practice of publishing an app workspace as an installable app to distribute the custom Power BI solution on a wide-scale basis. The module demonstrates how to upgrade reports and dashboards after an app has been installed using staged updates. The module explains the essential concepts involved with Power BI Premium and dedicated capacities and demonstrates how to configure an app workspace to run within a dedicated capacity. Along the way, this module will provide students with the decoder ring necessary to understand the capacity-based licensing model and strategies for distributing content to users with the Power BI free license.

Topics Covered

- Content Distribution in Power BI
- App Workspaces
- Publishing Apps
- Power BI Premium

Hands-on Lab: Deploying Solutions using Apps and App Workspaces

- Exercise 1: Create an App Workspaces and Add Content
- Exercise 2: Publish an App Workspace as a Power BI App

Module 09: Administrating and Configuring Security in Power BI

The module begins by explaining how Azure AD provides tenant-level support for managing and authenticating users and groups. The module explains how to administrate the Power BI environment at the tenant level and demonstrates how to use the Power BI audit logs to monitor activity with reports and dashboards. The module focusing on teaching students how to implement row-level security (RLS) in a Power BI Desktop project by creating security roles and writing DAX table filter expressions. The module also examines securing Power BI Desktop projects using a dynamic RLS strategy in which an RLS security role filtered using the USERNAME function in DAX together with a custom table that associates users with the data they are allows to access.

Topics Covered

- User Authentication and Identity
- Power BI Tenant Administration
- Data Security
- Row Level Security
- Dynamic Row Level Security

Hands-on Lab: Implementing Row Level Security (RLS)

- Exercise 1: Configure Security Roles to Enabled Row-level Security (RLS)
- Exercise 2: Publish the PBIX File and Configure Row-level Security (RLS)
- Exercise 3: Publish the Wingtip Sales RLS App Workspace as a Power BI App
- Exercise 4: Test the RLS Configuration using a Secondary User Account

Module 10: Introduction to R with Power BI

The final module of this course provides students with a fast and furious introduction to R as the world's most popular platform for advanced data analytics and data visualization. Students will learn how to get up and running with R by installing Microsoft R Open and RStudio. The module teaches students R programming fundamentals and explains how to import and load popular R packages. Students use RStudio to write and test R scripts which import data and generate R visualizations. After learning how to write and test R scripts in RStudio, students will then learn how to integrate R code into a Power BI Desktop project. Along the way, students will learn how to import data into a Power BI Desktop project using an R script as well as how to use the R script visual to enhance a Power BI report with visualizations created using powerful R visualization packages such as lattice and ggplot2.

Topics Covered

- Understanding R as a Data Analytics Platform
- Installing the Required Software for R Development
- Writing and Executing R Scripts using RStudio
- Writing R Scripts to Import Data into Power BI Desktop
- Working with the R Script Visual in Power BI Desktop

Hands-on Lab: Getting Up and Running with R in Power BI

- Exercise 1: Install Microsoft R Open and RStudio
- Exercise 2: Create and Execute R Scripts in R-Studio
- Exercise 3: Create a Power BI Query using an R Script Data Source
- Exercise 4: Write R Code to Generate Charts using the R Visual

