LOVELY PROFESSIONAL UNIVERSITY

INT374
Data Analytics with PowerBI

Lecture #0

The kick start session

Course details

- LTP – 2 0 2 [2 Lecture and 2 Practicals/week]
- Credit – 3

Marks Breakup

- Credits : 3
- Marks Breakup:

Activity	Marks
Attendance	5
Continuous Assessment	45
End-Term Practical (ETP)	50
Total	**100**

- 2 CAs, CA1-30 marks and CA2(Project)- 100 marks
- * No MTE

Text book and reference book

Text Books:

1. MASTERING POWER BI by CHANDRAISH SINHA, BPB PUBLICATIONS

References:

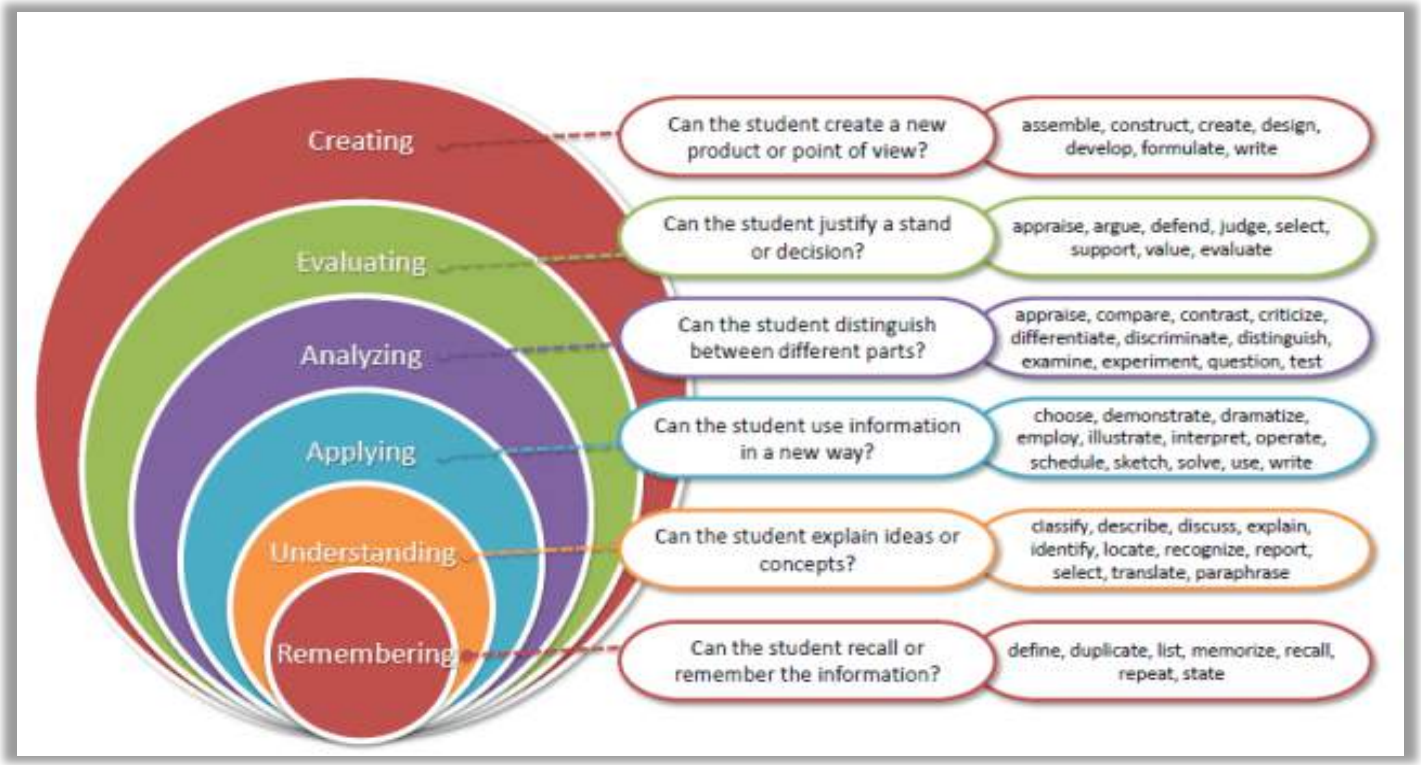
1. POWER BI DATA MODELING by NISAL MIHIRANGA, BPB PUBLICATIONS

Data Visualization with PowerBI

There are several reasons why Data Visualization with PowerBI is considered as wonderful course and can provide good placement opportunities:

- *Data Analysis and Visualization*
- *Time and Cost Savings*
- *Versatility and Adaptability*
- *Integration with Microsoft Ecosystem*
- *In-Demand Skill*
- *Competitive Advantage*
- *Career Growth Opportunities*

Revised Bloom's Taxonomy



Program Outcomes (POs)

PO1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

Program Outcomes (POs)

PO9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Course outcome

- CO1 :: Understand the setup, interface, and basic features of Power BI for data visualization
- CO2 :: Grasp and apply data preparation and transformation in Power BI.
- CO3 :: Apply data modeling techniques, including relationships, schemas, and hierarchies, to structure data in Power BI.
- CO4 :: Use DAX functions and calculations to create measures, columns, and advanced data insights in Power BI.
- CO5 ::Analyze and design user-friendly dashboards and interactive reports with effective design and advanced visualizations.
- CO6 :: Examine report performance using Power BI tools and best practices.

Course contents

- **Unit I Getting Started with Power BI:** - Overview of Power BI: Understanding the capabilities and applications of Power BI in data analysis and visualization.

- Installation and Setup: Step-by-step instructions for downloading and installing Power BI Desktop.

- Interface and Workflow: Familiarizing with the Power BI interface, including the report, data, and model views, and an overview of the workflow.

- Adjusting Settings: Configuring initial settings for Power BI, including region, language, and data loading preferences.

- **Unit II Connecting and Preparing Data:** - Power BI Front-End vs. Back-End: Distinguishing between Power BI's front-end (report view) and back-end (Power Query Editor) functionalities.

- Data Connectors: Understanding different types of data connectors (Excel, SQL Server, Web, etc.) and importing data into Power BI.

- Power Query Editor: Using Power Query Editor to shape and clean data.

- Basic Table Transformations: Techniques for renaming, moving, and shaping tables and columns.

- Database Connections: Steps to connect Power BI to databases for live or imported data.

- Extracting Data from the Web: Techniques for importing web-based data sources.

- .

Course contents

- Data QA & Profiling Tools: Performing quality checks and profiling on data sources.
  - Data Transformation Tools:
    - Text Tools: Data cleansing functions for text fields.
    - Numerical Tools: Transforming and aggregating numeric data-

Date & Time Tools: Working with date/time data transformations.

  - Advanced Transformations:
    - Change Type with Locale: Adapting data types based on region-specific formats.
    - Index & Conditional Columns: Creating index columns and conditional logic columns.
    - Grouping & Aggregating: Summarizing data by groups.
    - Pivoting & Unpivoting Data: Transforming data layouts.
    - Merging Queries: Combining data from multiple sources.
    - Data Source Settings: Managing data source configurations.

Course contents

Unit III – Building and Structuring Data Models: -

Data Modeling Fundamentals: Core principles of data modeling in Power BI.

- Database Normalization: Structuring data for efficiency by organizing tables.
- Fact & Dimension Tables: Identifying and differentiating fact tables and dimension tables.
- Relationships and Keys: Using primary and foreign keys to create table relationships.
- Managing Relationships:
  - Creating and Editing Relationships: Establishing relationships between tables.
  - Relationship Types: One-to-one, one-to-many, and many-to-many relationships.
- Schemas:
  - Star Schema: Building a central fact table with dimension tables around it.
  - Snowflake Schema: Using dimension tables connected in a more normalized structure.
- Filter Context and Flow: Understanding how filters propagate through a model.
- Bi-Directional Filters & Ambiguity: Managing filters in complex data models.
- Data Formats & Categories: Applying appropriate formats and data categories.
- Creating Hierarchies: Structuring data into hierarchies for drill-down functionality.

Course contents

- **Unit IV- Advanced Calculations with DAX : -**

Introduction to DAX: Understanding the DAX language, its syntax, and primary uses.

- Calculated Columns & Measures: Creating new data fields using calculations.
- Implicit vs. Explicit Measures: Understanding the difference between these measure types.
- DAX Syntax & Operators: Core syntax rules and mathematical/logical operators.
- DAX Functions:
  - Basic Math & Statistical Functions: SUM, AVG, COUNT, and more.
  - Conditional & Logical Functions: IF, SWITCH, AND, OR, etc.
  - Text Functions: CONCATENATE, LEFT, RIGHT, etc.
  - Date & Time Functions: NOW, TODAY, YEAR, etc.
- Advanced DAX Functions:
  - CALCULATE and FILTER: Applying filters within DAX expressions.
  - RELATED Function: Joining tables with DAX.
  - Iterator (X) Functions: Advanced row-by-row calculations with functions like SUMX, AVERAGEX.

Course contents

- **Unit V: Designing and Enhancing Visual Reports**

  - Dashboard Design Framework: Principles of effective dashboard design.
  - Sketching the Layout: Planning the layout and structure of the dashboard.
  - Report Pages & Objects: Adding, renaming, and organizing report pages and objects.
  - Visualizations:
    - Basic Chart Types: Line, bar, and donut charts.
    - Advanced Visuals: KPIs, gauges, and cards.
    - Trend Lines & Forecasts: Using trend lines to show projections.
    - Table & Matrix Visuals: Setting up tables and matrices with conditional formatting.
    - Map Visuals: Using geographic data for map visuals.
    - Report Slicers: Adding slicers for filtering data.
  - Filtering Options:
    - Top N Filtering: Displaying only the top items.
    - Conditional Formatting: Applying visual cues based on conditions.

Course contents

- **Unit 6: Optimizing Power BI Performance**

  - Optimization Tools:

    - Optimize Ribbon: Using Power BI's optimization features.

    - Optimization Presets: Using predefined settings to enhance performance.

  - Performance Analyzer: Analyzing report performance and troubleshooting issues.

Practical Exercises:

- Dashboard Layout Design: Sketch and build a basic dashboard layout.

- Chart Formatting: Experiment with formatting and customizing various chart types.

- DAX Functions: Practice using DAX for calculated fields, measures, and conditions.

- Data Modeling with Multiple Fact Tables: Connect multiple data sources with complex relationships.

- Using the Optimize Ribbon: Enhance report performance through optimization techniques.

- Performance Analyzer: Assess and improve report speed and efficiency.

CA for this course

- CA1 : BYOD PRACTICAL

  3 scenario- based questions in fraction of 10 marks each.

- CA2 : SKILL-BASED ASSESSMENT

1. Project Implementation and Viva (70 Marks)

Criteria:

- Design and Functionality of the Power BI Project (35 Marks):
- Data Analysis and Visualization (20 Marks):
- Viva Presentation (15 Marks):

2. Social Media (LinkedIn) Sharing (30 Marks)

Criteria:

- Likes (12 Marks):
- Shares (9 Marks):
- Comments (9 Marks):

Certification

- Certification: Power Bi Data Analyst

URL: https://learn.microsoft.com/en-us/credentials/certifications/exams/pl-300/

LOVELY PROFESSIONAL UNIVERSITY

Next: Introduction to Power BI