

Branch Name:	MCA
Program Code:	CS201
Course Code	4CS2010305P
Course Title	Data Visualization & Business Intelligence Practical
Pre-requisite Course:	Basic knowledge of Python programming, DBMS (SQL), statistics, and fundamental concepts of data analysis.

Course Objective:

1. To apply data preprocessing and visualization techniques
2. To develop interactive dashboards using BI tools
3. To analyze real-world datasets for decision-making
4. To build end-to-end Business Intelligence solutions

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
-	-	4	2	-	-	25	25	50

List of Experiments:

Experiment 1: Data Loading and Exploration

Objective: Understand dataset structure

Tasks:

- Load CSV/Excel dataset using Pandas
- Display summary statistics
- Identify missing values

Outcome: Basic understanding of dataset

Experiment 2: Data Preprocessing

Objective: Clean and prepare data

Tasks:

- Handle missing values
- Remove duplicates
- Data transformation and normalization

Outcome: Clean dataset ready for analysis

Experiment 3: Basic Data Visualization

Objective: Create simple charts

Tasks:

- Bar chart, line chart, pie chart
- Histogram and scatter plot using Matplotlib

Outcome: Understanding of basic visualizations

Experiment 4: Advanced Visualization using Seaborn

Objective: Perform statistical visualization

Tasks:

- Box plot, violin plot
- Heatmap (correlation matrix)
- Pair plot

Outcome: Analyze relationships between variables

Experiment 5: Interactive Visualization using Plotly

Objective: Create dynamic and interactive plots

Tasks:

- Interactive bar and scatter plots
- Dashboard-style visualization

Outcome: Interactive data exploration

Experiment 6: Exploratory Data Analysis (EDA)

Objective: Perform detailed data analysis

Tasks:

- Identify trends and patterns
- Correlation analysis
- Outlier detection

Outcome: Extract meaningful insights

Experiment 7: Time Series Visualization

Objective: Analyze time-based data

Tasks:

- Plot trends over time
- Moving averages
- Seasonal analysis

Outcome: Time-based insights

Experiment 8: Geospatial Visualization

Objective: Visualize location-based data

Tasks:

- Create maps using Plotly / Folium
- Heatmaps for geographical data

Outcome: Spatial data understanding

Experiment 9: Introduction to Power BI / Tableau

Objective: Learn BI tools interface

Tasks:

- Import dataset
- Data transformation
- Create basic reports

Outcome: Familiarity with BI tools

Experiment 10: KPI and Business Metrics Analysis

Objective: Analyze business performance

Tasks:

- Create KPIs (Sales, Profit, Growth)
- Visualize metrics using dashboards

Outcome: Business decision insights

Experiment 11: Dashboard Development

Objective: Build interactive dashboards

Tasks:

- Use filters, slicers, drill-down
- Combine multiple visualizations

Outcome: Professional dashboard creation

Experiment 12: ETL Process Implementation

Objective: Simulate ETL workflow

Tasks:

- Extract data from multiple sources
- Transform and clean
- Load into structured format

Outcome: Understanding of data pipelines

Experiment 13: Case Study Analysis

Objective: Solve real-world problem

Tasks:

- Choose dataset (finance, healthcare, etc.)
- Perform visualization and analysis
- Present findings

Outcome: Practical problem-solving skills

Experiment 14: Mini Project (End-to-End BI Solution)

Objective: Develop complete BI system

Tasks:

- Data collection
- Data cleaning and analysis
- Visualization and dashboard
- Final report and presentation

Outcome: Industry-level project experience

Software / Tools Required

- Python (Jupyter Notebook / Google Colab)
- Libraries: Pandas, NumPy, Matplotlib, Seaborn, Plotly
- Power BI / Tableau
- MS Excel / CSV datasets

Text Books:

1. Data Visualization: A Practical Introduction – *Kieran Healy*
2. Storytelling with Data – *Cole Nussbaumer Knaflitz*
3. Fundamentals of Business Intelligence – *Wilfried Grossmann*

References Books:

1. The Visual Display of Quantitative Information – *Edward Tufte*
2. Python for Data Analysis – *Wes McKinney*
3. Business Intelligence Guidebook – *Rick Sherman*

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Apply visualization techniques to explore and analyze complex datasets	3.Apply 4.Analyze
CLO2	Design interactive and meaningful dashboards using BI tools	3.Apply 6. Create
CLO3	Implement data warehousing and BI concepts for business applications	3.Apply 4.Analyze
CLO4	Interpret data insights for strategic decision-making	4.Analyze 5.Evaluate
CLO5	Develop end-to-end BI solutions using modern tools	3.Apply 6. Create

Mapping of CLOs with POs & PSOs

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes(PSOs)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CLO1	H	M	M	M	H	L	M	L	L	L	L	L	H	M
CLO2	H	H	H	H	H	L	M	M	M	L	M	M	H	M
CLO3	H	H	H	H	H	L	M	M	L	L	M	M	H	M
CLO4	M	H	M	M	M	H	H	M	H	M	M	M	M	H
CLO5	H	H	H	H	H	H	H	H	M	M	H	H	H	H

H:High, M:Medium, L:Low