

## BCSE 0743: DATA VISUALIZATION LAB

**Objective:** The main aim of the lab enables the students to understand the principles of effective data visualization, explore various types of charts and graphs and learn best practices in data design and storytelling.

**CREDIT: 01**

**L-T-P-J: 0-0-2-0**

Module No.	Content	Teaching Hours
I	<ul style="list-style-type: none"> <li>Getting Started with Power BI/Tableau. Import a simple CSV dataset (e.g., Superstore, Iris) and explore basic views: table, bar, and line charts.</li> <li>Data Cleaning and Transformation. Use Power Query (Power BI) or Data Interpreter (Tableau) to clean missing values, rename columns, change data types, and create calculated fields.</li> <li>Creating Bar and Line Charts for series data. Use sales or stock market datasets to create bar charts for categories and line charts for trends over time. Add tooltips and labels.</li> <li>Interactive Dashboards with Filters and Slicers. Build a dashboard for a retail dataset that includes filters for region, category, and date. Use slicers (Power BI) or filter actions (Tableau).</li> <li>Geo-Visualization with Maps. Use a dataset with location data (e.g., country/state/city-wise sales or COVID-19 cases) and create a filled map or symbol map.</li> <li>Pie and Donut Charts for Category Proportion. Use a dataset like the Olympic medals dataset to show proportions using pie and donut charts. Analyze medal share by country.</li> <li>Creating KPI Cards and Custom Metrics. Create KPIs such as Total Sales, Profit Margin, and Growth Rate using DAX (Power BI) or Calculated Fields (Tableau). Display as cards.</li> <li>Heatmaps and Tree Maps. Create heatmaps for correlation matrices and tree maps for category-wise sales in a multilevel category dataset (e.g., Category &gt; Subcategory).</li> <li>Time Series Forecasting and Trend Lines. Use a stock price or sales dataset to add trend lines, moving averages, and forecasts. Explore Tableau's forecast model or Power BI's analytics panel.</li> <li>Capstone: Storytelling with Dashboards. Choose a theme (e.g., GDP growth, education statistics, environmental data), prepare and clean the data, and build an interactive dashboard that tells a compelling story using both Tableau and Power BI. Present findings.</li> </ul>	24

### Text Book:

- Data Visualization: A Practical Introduction" by Kieran Healy
- Python Data Visualization: An Introduction to Data Visualization in Python with Matplotlib, Seaborn, and Plotly" by Adel Osmani
- The Visual Display of Quantitative Information" by Edward Tufte

### Reference Books:

- "Storytelling with Data: A Data Visualization Guide for Business Professionals" By Cole Nussbaumer Knaflic
- "Data Visualization: A Practical Introduction" By Kieran Healy
- "Fundamentals of Data Visualization: A Primer on Making Informative and Compelling Figures" By Claus O. Wilke

- "Interactive Data Visualization for the Web" By Scott Murray
- "Python Data Science Handbook" By Jake VanderPlas
- "Designing Data Visualizations: Representing Informational Relationships" By Noah Iliinsky and Julie Steele
- "Data Visualization with Python and JavaScript" By Kyran Dale
- "Practical Statistics for Data Scientists" By Peter Bruce, Andrew Bruce, and Peter Gedeck
- "Information Dashboard Design: The Effective Visual Communication of Data" By Stephen Few

**Course Outcomes (CO):** Upon completion of this course students will be able to:

- **CO1:** Understand the Fundamentals of Data Visualization
- **CO2:** Apply Visualization Best Practices to Gain Proficiency with Visualization Tools
- **CO3:** Design and Develop Data Stories and Dashboards
- **CO4:** Analyze Real-World Use Cases and Ethical Considerations.
- **CO5:** Collaborate and Present Visual Data Projects

**Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):**

COs	POs/PSOs
CO1	PO1/PSO3
CO2	PO2,PO3/PSO1
CO3	PO4/PSO1,PSO3
CO4	PO2,PO3/PSO4
CO5	PO2,PO4/PSO4