**Marwadi University**
**Faculty of Technology**
**Department of Information and Communication Technology**

# Subject Code: 01CT0410

## Subject Name: Data Visualization and Dashboard

## B. Tech. Year – II (Semester IV)

**Objective:**
This course will teach students how to analyze, import, summarize, and visualize data. The students will evaluate the advantages and disadvantages of multiple visualization techniques. Moreover, they will be exposed to several tools for visualization.

**Credits Earned:** 02 Credits

**Course Outcomes:** After completion of this course, student will be able to:

1. Create compelling, interactive dashboards to combine several visualizations into a cohesive and functional whole. (Understand).
2. Visualization tools to conduct data analysis, especially exploration of an unfamiliar dataset. (Analyze).
3. Employ best practices in data analysis through visualization to develop charts, maps, tables, and other visual representations of data. (Analyze).
4. Utilize advanced features including parameters, data blending, very large datasets, custom date hierarchies, and use data visualizations, dashboards, and Stories to support relevant communication for diverse audiences. (Apply).

**Pre-requisite of course:**
This subject is focused on analyzing data, importing, summarizing, and visualizing data.

**Teaching and Examination Scheme:**

| Teaching Scheme (Hours) | | | Credits | Theory Marks | | | Tutorial / Practical Marks | | Total Marks |
|---|---|---|---|---|---|---|---|---|---|
| | | | | E | I | | V | T | |
| Theory | Tutorial | Practical | | ESE | IA | CSE | Viva | Term Work | |
| 01 | 00 | 02 | 02 | 0 | 30 | 20 | 25 | 25 | 100 |

**Contents:**

| Unit | Topics | Hours |
|---|---|---|
| 1 | **Introduction and Overview:** Basic of Data analytics tools, Debug and troubleshoot installation and configuration of the software, Configuring Data Environment, Connecting to Data, Metrics vs dimensions, Data types and defaults, Aliases and names, Introduction to Looker and its associated functions. | 04 |
| **2** | **Plot Types:** Basic plotting and applied visualization: Line plot, Bar plot, Pie Chart, pivot chart, Scatter Plot, Histogram, Box plot, Density Plot, Heat map | 01 |
| **3** | **Understanding Data:** Data Attribute, Data transformation, data cleaning, normalization, standardization, data correlation | 02 |
| **4** | **Data Visualization Concepts:** Exploratory Visualization, Data Joins, Creating visualizations with analytics tool, Sorting, Top N, bottom N, Filtering | 02 |
| **5** | **Visual Analytics:** Optimal visualization types, Binning values, Calculated fields, Table calculations, Level of Detail calculations, Dashboard development, Dashboard design principles, Dashboard interactivity, Connected "drill-down" dashboards. | 02 |
| **6** | **Advanced Concepts:** Handling Large datasets, Fiscal Year Calculations, Parameters, working with stakeholders and creating analytical products, Stakeholder categories, receiving feedback, performing design iterations, ETL (e chart, transform and load), over data. | 03 |
| | **Total Hours** | 14 |

**Suggested Text books / Reference books:**

1. Few Stephen, Show Me the Numbers: Designing Tables and Graphs to Enlighten (2 ed.), Analytics Press, 2012.
2. Steve Wexler, Jeffrey Shaffer and Andy Cotgreave, The Big Book of Dashboards: Visualizing Your Data Using Real-World Business Scenarios (1 ed.), John Wiley & Sons, 2017.
3. Stephen Few, Information Dashboard Design: Displaying Data for At-a-glance Monitoring (2 ed.), Analytics Press, 2013.

**Suggested Theory distribution:**

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching- learning process.

| Distribution of Theory for course delivery and evaluation | | | | | |
|---|---|---|---|---|---|
| Remember | Understand | Apply | Analyze | Evaluate | Create |
| 5% | 25% | 30% | 25% | 10% | 5% |

**Suggested List of Experiments:**

1. To create basic charts and pivot charts in Excel.
2. Draw the following plots/graphs using plotly, matplotlib and seaborn libraries in python on random dataset. Also, save the plots/graphs to a file (png, jpg, etc). Give the appropriate label to x axis, y axis and title. (Line plot, Scatter plot, Box plot)
3. Draw the Horizontal Bar chart, Histogram with Plotnine, and Stacked Bar Plot using plotly, matplotlib and seaborn libraries in python on random dataset.
4. Draw basic plots using Tableau (Dual axis chart, Waterfall chart, Bubble chart and Timeline charts)
5. Creating and customizing line charts using Matplotlib
6. Visualizing relationships between two or more variables using scatter plots
7. Visualizing two-dimensional data using heatmaps
8. Visualizing data with Seaborn with Python
9. Visualizing data with Pandas and Plotnine
10. Visualization of semi-structured data using python
11. Crating Interactive Visualization using plotly in Python
12. Create Infographs for Dashboards and Storytelling in Excel
13. Creating visualizations & dashboards using data analytics tool with Case study 1
14. Creating visualizations & dashboards using data analytics tool with Case study 2
15. Creating visualizations & dashboards using data analytics tool with Case study 3

**Supplementary Resources:**

1. Data Visualization with Tableau Specialization https://www.coursera.org/specializations/data-visualization
2. Visualizing Data with Google Data Studio https://in.coursera.org/projects/googlecloud-visualizing-data-with-google-data-studio-linat
3. Share Data Through the Art of Visualization https://in.coursera.org/learn/visualize-data
4. Power BI for Beginners https://www.simplilearn.com/learn-power-bi-basics-free-course-skillup