

**Subject Code:**

**Subject Name: Data Visualisation and Analysis**

**M.Tech. Year –2023-24**

**Objective:**

This course introduces students to data analysis and visualization in the field of exploratory data science using Python.

**Credits Earned:** 3 Credits

**Course Outcomes:** After completion of this course, students will be able to (Atleast 4)

- Identify various forms of data from the live environment and extract data from platforms like social media and websites using data entry and web scraping using scraping tools.
- Create Interactive data visualization using Excel and perform preprocessing data cleaning and removal of outliers from data, dealing with missing values, and creating visualizations of various types of data.
- Create Interactive data visualization using Tableau.
- Create data visualizations using Power BI.

**Teaching and Examination Scheme**

Subject code	Subject name	Category	Teaching scheme (hours)			Credit	Theory marks			Tutorial/practical work	
			Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term work
	Data Visualisation and Analysis	PEC	3	0	0	3	50	30	20	0	0

**Contents:**



<b>Unit</b>	<b>Topics</b>	<b>Hours</b>
1	<b>Unit Title: Introduction</b> Introduction to Data Science, Exploratory Data Analysis and Data Science Process. Motivation for using Python for Data Analysis, Introduction of Python shell iPython and Jupyter Notebook. <b>Essential Python Libraries:</b> NumPy, pandas, matplotlib, SciPy, scikit-learn, statsmodels.	4
2	<b>Unit Title: Getting Started with Pandas</b> Pandas: Introduction to Pandas Importing data into Python Pandas Data Frames, Indexing Data Frames, Basic Operations With Data frame, Renaming Columns, Subsetting and filtering a data frame.	8
3	<b>Unit Title: Data Visualization using Matplotlib and Data Visualization using Seaborn.</b> <b>Matplotlib:</b> Introduction, plot(), Controlling Line Properties, Subplot with Functional Method, Multiple Plot, Working with Multiple Figures, Histograms <b>Seaborn:</b> Intro to Seaborn And Visualizing statistical relationships, Import and Prepare data. Plotting with categorical data and Visualizing linear relationships. Seaborn Exercise.	8
4	<b>Unit Title: Data visualization in Excel.</b> Creating a New Workbook Navigating in Excel Moving the Cell Pointer Using Excel Menus Creating Headers, Footers, and Page Numbers Adjusting Page Margins and Orientation Adding Print Titles and Gridlines, rows to repeat at the top of each page Formatting Fonts and values Adjusting Row Height and Column Width Changing Cell Alignment Adding Borders Applying Colors and Patterns Using the Format Painter Merging Cells, Rotating Text Using AutoFill. <b>Working with the Forms Menu:</b> Sorting, Subtotaling & Filtering Data Copy & Paste Filtered Records Using Data Validation <b>Changing a Chart Type and Working with Pie Charts:</b> Adding Titles, Gridlines, and a Data Table Formatting a Data Series and Chart Axis Using Fill Effects. <b>Using Excel Toolbars: Hiding, Displaying, and Moving Toolbars:</b> Entering Values in a Worksheet and Selecting a Cell Range Previewing and Printing a Worksheet Saving a Workbook & Re-opening a saved workbook. <b>Creating &amp; Working with Charts:</b> Creating a Chart Moving and Resizing a Chart Formatting and Editing Objects in a Chart Changing a Chart's Source Data. <b>Data Analysis &amp; Pivot Tables:</b> Creating a PivotTable Specifying the Data a PivotTable Analyzes Changing a PivotTable's Calculation.	10
5	<b>Unit Title: Tableau</b> <b>Introduction to Tableau:</b> Connecting to data source Creating dashboard pages How to create calculated columns Different charts <b>Dashboard and Stories:</b> Working in Views with Dashboards and Stories Working with Sheets Fitting Sheets Legends and Quick Filters Tiled and Floating Layouts, Floating Objects.	10

	<b>Visual Analytics:</b> Getting Started With Visual Analytics Sorting and grouping Working with sets, set action Filters: Ways to filter, Interactive Filters Forecasting and Clustering	
6	<b>Unit Title: Power BI</b> Installing Power BI Desktop and Connecting to Data Overview of the Workflow in Power BI Desktop Introducing the Different Views of the Data Mode Query Editor Interface Working on Data Model	8

**References:**

1. McKinney, W.(2017). Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython. 2nd edition. O'Reilly Media.
2. O'Neil, C., & Schutt, R. (2013). Doing Data Science: Straight Talk from the Frontline O'Reilly Media.

Suggested Theory distribution:

Distribution of Theory for course delivery and evaluation

Remember	Understand	Apply	Analyse	Evaluate	Create
10%	25%	30%	10%	10%	10%