



TECHNOCATION FREELANCING TRAINING INSTITUTE & SOFTWARE HOUSE

Professional MATPLOTLIB Course Outline

Module 1: Introduction to Matplotlib

- What is Matplotlib? Why is it Important?
- Installing and Setting Up Matplotlib (`pip install matplotlib`)
- Basic Components of a Matplotlib Plot
- Creating a Simple Plot (`plt.plot()`)

Module 2: Understanding Matplotlib Figures and Axes

- Anatomy of a Matplotlib Figure (Figure, Axes, Axis)
- Creating Multiple Subplots (`plt.subplots()`)
- Adjusting Figure Size and Layout (`figsize`, `tight_layout()`)
- Saving Figures in Different Formats (`.png`, `.jpg`, `.pdf`)

Module 3: Customizing Plots

- Changing Line Styles, Markers, and Colors
- Adding Titles, Labels, and Legends
- Adjusting Tick Marks and Grids
- Annotating Plots (`plt.annotate()`)

Module 4: Working with Different Plot Types

- **Line Plots** (`plt.plot()`)
- **Scatter Plots** (`plt.scatter()`)
- **Bar Charts and Histograms** (`plt.bar()`, `plt.hist()`)
- **Pie Charts** (`plt.pie()`)
- **Box Plots and Violin Plots** (`plt.boxplot()`, `seaborn.violinplot()`)

Module 5: Advanced Plot Customization

- Using Colormaps and Color Gradients (`cmap`)
- Customizing Axes and Log Scales (`plt.xscale()`, `plt.yscale()`)
- Creating Twin Axes (`twinx()`, `twiny()`)
- Adding Inset Plots (`inset_axes()`)

Module 6: Working with 3D Plots

- Introduction to `mpl_toolkits.mplot3d`
- Creating 3D Line and Scatter Plots
- 3D Surface Plots and Wireframes
- Customizing 3D Axes

Module 7: Working with Dates and Time Series Data

- Formatting Date-Based Plots (`mdates`)
- Time Series Data Visualization
- Handling Missing Time Data
- Rolling Window Plots

Module 8: Interactive and Animated Plots

- Creating Interactive Plots with `plt.pause()`
- Using `FuncAnimation` for Animated Plots
- Embedding Matplotlib in GUIs (`Tkinter`, `PyQt`)
- Interactive Widgets (`mpl.widgets`)

Module 9: Integrating Matplotlib with Other Libraries

- Using Matplotlib with Pandas (`df.plot()`)
- Combining Matplotlib with Seaborn for Advanced Styling
- Integrating with Plotly and Bokeh for Interactive Visualizations
- Exporting Figures for Reports and Dashboards

Final Module: Capstone Project & Certification

- Implementing Real-World Data Visualizations
- Creating Custom Dashboards with Matplotlib
- Presenting Insights with Effective Plots
- Course Completion Certification