Python Programming
Unit 06 – Lecture 05 Notes
Matplotlib Fundamentals (pyplot, labels, grid)

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February 14, 2026

Contents

1 Lecture Overview

Matplotlib is the most commonly used plotting library in Python. This lecture focuses on basic plotting with `matplotlib.pyplot`:

- line plots,
- labels and title,
- grid and legend,
- saving plots to files.

2 Setup (If Needed)

If Matplotlib is not installed:

```
pip install matplotlib
```

3 Core Concepts

3.1 Basic Plot Workflow

Typical steps:

1. prepare x and y data,
2. call `plt.plot(...)` or another plotting function,
3. add labels/title/legend,
4. show or save the plot.

```
import matplotlib.pyplot as plt

x = [1, 2, 3, 4]
y = [2, 4, 6, 8]

plt.plot(x, y)
plt.show()
```

3.2 Labels, Title, Grid, Legend

```
plt.plot(x, y, label="y = 2x")
plt.title("Line Plot")
plt.xlabel("x")
plt.ylabel("y")
plt.grid(True)
plt.legend()
```

3.3 Customization

You can customize style:

- color (`color="red"`)
- line style (`linestyle="-"`)
- marker (`marker="o"`)

3.4 Saving Plots

```
plt.savefig("images/line_plot.png", dpi=150)
```

Tip: create the output folder before saving.

4 Demo Walkthrough

File: `demo/matplotlib_line_plot_demo.py`

This demo creates a customized plot and saves it into `images/`.

5 Interactive Checkpoints (with Solutions)

Checkpoint 1 Solution

Question: What does `plt.grid(True)` do?

Answer: It draws a grid on the plot background to improve readability.

Checkpoint 2 Solution

Question: Why labels and titles?

Answer: They explain what the plot represents; without labels, a plot can be confusing or misleading.

6 Practice Exercises (with Solutions)

Exercise 1: Plot Squares

Task: Plot $y = x^2$ for $x = 1..10$.

Solution:

```
import matplotlib.pyplot as plt

x = list(range(1, 11))
y = [i*i for i in x]

plt.plot(x, y, marker="o")
plt.title("y = x^2")
plt.xlabel("x")
plt.ylabel("y")
plt.grid(True)
plt.show()
```

7 Exit Question (with Solution)

Question: function used to save a plot?

Answer: `savefig`