# Roadmap For Python for Data Analysis + REST APIs

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### 🧭 Overall Goal:

- Learn **Python for Data Analysis**
- Master **REST APIs** with authentication techniques
- Work with **real-world data** (pull from APIs, analyze, and visualize)
- Build **mini-projects** for practice and portfolio

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## 📘 Chapter 1: Python Refresher (1 Week)

### ✅ What to Learn:

- Data Types, Variables, Comments
- Operators, Conditional Statements
- Loops (for, while)
- Functions (with args/kwargs)
- List, Tuple, Dictionary, Set
- Basic Exception Handling

### 📚 Resources:

- W3Schools Python Basics
- Python Programming (freeCodeCamp)

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## 📘 Chapter 2: Intermediate Python for Data (1.5 Weeks)

### ✅ What to Learn:

- List Comprehension
- Lambda Functions

- Map, Filter, Reduce
- Error Handling (try-except-else-finally)
- Working with Files (read, write CSV/JSON)
- Python Modules & Imports

### 📚 Resources:

- Real Python – Intermediate Python
- Python Docs - File Handling

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## 📘 Chapter 3: NumPy and Pandas for Data Analysis (2 Weeks)

### ✅ What to Learn:

- NumPy: Arrays, Indexing, Broadcasting, Vectorized Ops
- Pandas: DataFrame, Series
- Data Cleaning (missing values, duplicates)
- GroupBy, Merge, Concat, Apply
- Handling Dates/Time
- Basic Exploratory Data Analysis (EDA)

### 📚 Resources:

- freeCodeCamp: NumPy + Pandas Full Tutorial
- Kaggle – Pandas Course
- Book: *Python for Data Analysis* by Wes McKinney (Free PDF online)

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## 📘 Chapter 4: Data Visualization (1 Week)

### ✅ What to Learn:

- Matplotlib & Seaborn (Line, Bar, Histogram, Heatmaps)
- Plotly (Interactive Dashboards)
- Styling and Customizing Graphs
- Visualize insights from real data

### 📚 Resources:

- Data Visualization with Python - IBM (Coursera)
- Seaborn Gallery
- Plotly Python

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## 📘 Chapter 5: REST APIs & Requests (2 Weeks)

### ✅ What to Learn:

- What is REST API?
- GET, POST, PUT, DELETE methods
- JSON responses and parsing
- Python requests library
- Query Parameters, Headers

### 📚 Resources:

- Real Python – APIs with Requests
- Python Requests Docs

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## 📘 Chapter 6: API Authentication (2 Weeks)

### ✅ What to Learn:

- Working with API Keys
- Bearer Token Authentication
- OAuth 2.0 Basics
- Client ID / Client Secret flow
- Refresh Tokens
- Use Postman to test APIs
- Hands-on with real APIs like:
    - OpenWeather
    - CoinGecko
    - Spotify API (needs Auth)
    - Twitter/X API (OAuth)
    - RapidAPI or NewsAPI

### 📚 Resources:

- Postman Beginner Guide
- YouTube: How to use APIs with Auth in Python
- OAuth 2.0 Simplified Guide

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## 📘 Chapter 7: Mini Projects (2 Weeks)

### ✅ What to Build:

1. **Weather Dashboard**
    - Use OpenWeather API to pull weather data, visualize temp trends
2. **Crypto Tracker**

- Use CoinGecko API to show top crypto prices, make plots

3. **Spotify Playlist Analyzer**
    - Use Spotify API + Auth to get your playlists and analyze genre, popularity
4. **News Dashboard**
    - Use NewsAPI to show trending headlines by topic
5. **Custom API Project**
    - Pick an API, pull data, clean with Pandas, and visualize it

## 📚 Tools:

- Python
- Pandas, Plotly/Seaborn
- Requests
- Streamlit (if you want to build a web UI)

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## ⚙️ Optional Add-ons (After the Roadmap)

- Learn Web Scraping (BeautifulSoup, Selenium)
- Build Flask API (your own API to expose data)
- Learn how to schedule Python scripts with cron or task scheduler