Module 1: Python Fundamentals

Data Science with Python – BSc Course

Why Python Fundamentals?

In 2018, Goldman Sachs made Python its primary programming language for new analysts. Today, JPMorgan's Athena platform runs 35 million daily calculations in Python.
The message is clear: Python is no longer optional in finance. Whether you end up in trading, risk management, or fintech, Python fluency is your entry ticket.
This module builds your foundation in Python from absolute zero to writing financial data scripts.

Python is the lingua franca of quantitative finance

Why This Matters

- **Industry standard:** 75% of hedge funds use Python for research and trading systems
- **Career requirement:** Most quantitative finance roles list Python as a mandatory skill
- **Automation:** Replace hours of manual Excel work with minutes of code
- **Foundation:** Every technique in this course builds on these Python fundamentals

Skills that directly translate to employability in finance

What You'll Learn

By the end of this module, you will be able to:

- Set up and navigate a Python development environment
- Work with core data types: integers, floats, strings, booleans
- Use lists, dictionaries, and tuples to organize financial data
- Write conditional logic and loops for data processing tasks
- Define reusable functions for financial calculations

From zero Python knowledge to writing financial data scripts

Lesson Roadmap

Lesson	Topic	Focus
L01	Python Setup	Jupyter, data types, variables
L02	Data Structures	Lists, dictionaries, tuples
L03	Control Flow	If/else, for/while loops
L04	Functions	Parameters, returns, scope
L05	DataFrames Introduction	pandas basics, loading CSV
L06	Selection & Filtering	Boolean indexing, queries

Each lesson: 45 minutes lecture + hands-on exercises

Key Concepts

- **Variables & Types** – Store and manipulate financial data effectively
- **Control Flow** – Make decisions in code (buy/sell logic, conditionals)
- **Functions** – Reusable building blocks for financial analysis
- **DataFrames** – The spreadsheet of Python (like Excel on steroids)
- **Indexing & Filtering** – Select exactly the data you need for analysis

Master these and you have the foundation for everything that follows

Finance Application

Scenario: Daily Portfolio Tracker
Using only the skills from this module, you can build a script that:

- Loads daily stock prices from a CSV file
- Calculates daily returns and cumulative performance
- Filters for stocks that dropped more than 5%
- Generates a simple performance summary report

This is a real task that junior analysts do manually in Excel every morning.

Automate what analysts do by hand – this module gives you the tools

Who Uses This?

- **Investment Banks** – Goldman Sachs, JPMorgan, Morgan Stanley use Python for pricing and risk
- **Hedge Funds** – Two Sigma, Citadel, AQR run research pipelines entirely in Python
- **Fintech** – Stripe, Revolut, N26 build products with Python backends
- **Regulators** – BaFin and ECB use Python for supervisory data analysis

Python skills are valued across the entire financial industry

What's Next: Module 2 – Data Manipulation

Now that you can write Python, the next step is working with real datasets.
Module 2 introduces pandas DataFrames – the core tool for handling financial data: missing values, merging multiple sources, time series alignment.
Prerequisite check: Can you create a list, write a for-loop, and define a function? If yes, you are ready.

Python fundamentals are your toolkit – Module 2 puts them to work on real data

Let's Begin!

First up: L01 – Python Setup

Open your laptop and follow along.