

Semester:04	Course No.: 404	Course Code: QTE203-1C
Credits:04	Course Title: Python for Finance & Algo Trading	Course Category: Minor

Course Outcomes:

CO#	COGNITIVE ABILITIES	COURSE OUTCOMES
CO102.1	Remember	Recall Python programming fundamentals, data types, and syntax used in financial analysis.
CO102.2	Understanding	Understand core libraries like Numpy and Pandas to perform data operations and visualizations.
CO102.3	Applying	Apply Python tools for manipulating time-series data, creating portfolios, and analyzing performance
CO102.4	Analyzing	Analyze historical stock data, calculate financial indicators, and evaluate portfolio risk and return.
CO102.5	Evaluating	Evaluate and backtest trading strategies using statistical performance metrics and Sharpe Ratio.

Course Syllabus

Unit No.	Unit Contents	Sessions Allotted
1	<p>Python Basics & Financial Foundations</p> <ul style="list-style-type: none"> • Anaconda and Jupyter Notebook walkthrough • Future Value, Present Value • Interest Rates and Stock Returns • Python Basics: Variables, Data Types (Integers, Floats, Booleans) • Lists: Indexing, Element-wise Operations, Sorting, Reversing • Tuples and Strings: Replacement, Manipulation • Control Flow: For Loops, Range Objects 	15
2	<p>Numerical & Data Analysis with NumPy and Pandas (Basic)</p> <ul style="list-style-type: none"> • NumPy Basics: Arrays, Indexing & Slicing, Universal Functions • Boolean Arrays & Conditional Filtering 	15

	<ul style="list-style-type: none"> • Creating Arrays from Scratch, Nested Lists, Dimensional Arrays • Arithmetic with 2D Arrays, Merging & Concatenating • Pandas Basics: DataFrames, Built-in Functions, Selecting/Slicing Data • Data Inspection, Summary Stats • Data Visualization: Matplotlib (Customization, Histograms, Scatter Plots) • Seaborn Heatmaps 	
3	<p>Intermediate to Advanced Pandas + Time Series Data</p> <ul style="list-style-type: none"> • Changing Row/Column Index, Handling Null Values • Exporting DataFrames • Deleting/Adding Columns & Rows • Arithmetic Ops on DataFrames, Creating from Scratch • GroupBy, Split-Apply-Combine, Stack & Unstack • Time Series Basics: DateTime Conversion, Indexing/Slicing • Normalizing Time Series, Risk & Return Analysis 	15
4	<p>Portfolio Construction & Backtesting Strategies</p> <ul style="list-style-type: none"> • Portfolio Simulation: Data Collection, Equal-Weighted Portfolio • Random Portfolios, Sharpe Ratio Analysis • Factor Index Creation • Intro to Spyder IDE • Backtesting Strategy: Stock Price Dictionary, RSI, Stochastics, Chandelier Exit • Indicator Level Calculation • Strategy Logic & Performance Metrics 	15

Suggested Textbooks:

1. Faculty Notes

Suggested Reference Books:

1. "Python for Finance: Mastering Data-Driven Finance" by Yves Hilpisch
2. "Python for Finance: Analyze Big Financial Data" by Matt Taddy
3. "Hands-On Financial Trading with Python" by Saurav Singla