

2-weeks Online Training  
 On  
**Financial Data Analysis with AI, Machine Learning,  
 Time Series & Algorithm Trading**  
**Duration:** Total 30 Hours

### Training Highlights:



**5+ Hands-on Projects**  
 covered during the training.



**Total 30+ Hours**  
 Live online Instructor-led Training.



**Training includes:**  
 Projects, Study Material, Training Recording.



**Certificate of completion**  
 association with Mechanica IIT Madras

### TRAINING MODULES (2-weeks)

Modules:	TOPICS
Module 1	<ul style="list-style-type: none"> <li>Financial Analysis Introduction</li> <li>Python Programming</li> </ul>
Module 2	<ul style="list-style-type: none"> <li>Working With Numpy</li> <li>Data Manipulation – Cleansing – Munging Using Pandas</li> <li>Data Analysis – Visualization Using Python</li> </ul>
Module 3	<ul style="list-style-type: none"> <li>Implementation of Stats Methods</li> <li>Machine Learning Foundation</li> <li>Machine Learning Algorithms &amp; Applications</li> </ul>
Module 4	<ul style="list-style-type: none"> <li>Time Series Fundamentals</li> <li>Simple Time Series</li> <li>Arima &amp; Sarima – Time Series Forecasting</li> </ul>
Module 5	<ul style="list-style-type: none"> <li>Introduction to Portfolio Allocation Risk Management</li> <li>Finance Fundamentals &amp; Strategy</li> <li>Better Investment Decisions – Piotroski F-Score</li> <li>Quant Finance</li> </ul>

## TRAINING PROJECTS:

TRAINING PROJECTS	
<b>Module 1 &amp; 2</b>	 <ul style="list-style-type: none"> <li>• Facebook Shares Time Series Data with interesting insights.</li> <li>• EDA, Data Mangling and Visualizing using Microsoft Financial Data.</li> <li>• Insights &amp; Analysis Daily Percentage Change, Cumulative Daily Returns, Comparing Daily Returns using Stock Data</li> </ul>
<b>Module 3</b>	 <ul style="list-style-type: none"> <li>• Hypothesis Testing, P Value, Estimate Average Stock Return on Financial Data</li> <li>• Forecasting Google Shares: Regression Analysis &amp; Predictive using on Google Shares Price</li> </ul>
<b>Module 4</b>	 <ul style="list-style-type: none"> <li>• Car Stock Market Analysis: Analyzing stock data related to car companies like Tesla vs Ford vs GM from Jan 2012 to Jan 2020.</li> <li>• Stats Model Analysis: Decomposition, Stationarity Testing, Differencing, Autocorrelation Plots and Interpretation.</li> <li>• Monthly Production Forecasting: ARIMA and SARIMA monthly Production Time Series Forecasting.</li> </ul>
<b>Module 5</b>	 <ul style="list-style-type: none"> <li>• Financial Portfolio Allocation and Optimization: Portfolio Values, Statistics, Sharpe Ratio.</li> <li>• Piotroski F-score: F-Score calculation, how good Piotroski F-score predicts stock returns, Plotting the Piotroski F-Score.</li> <li>• Trading Strategy on Financial Data: Implementation of Financial Back testing, First Trading Algorithm</li> </ul>

## COURSE CONTENT (2-weeks [30-HOURS])

### FINANCIAL ANALYSIS, TIME SERIES AND ALGORITHM TRADING

COURSE CONTENT (30-Hours)	
<b>TERM 1:</b>	<p><b>FINANCIAL ANALYSIS INTRODUCTION</b></p> <ul style="list-style-type: none"> <li>• What is Data Science</li> <li>• What is Machine Learning</li> <li>• Machine Learning vs. Data Science vs. AI</li> <li>• How information hierarchy can be improved/introduced</li> <li>• Overview of Analytics for Banking</li> <li>• Understanding Financial Analysis</li> <li>• How leading companies are harnessing the power of Data Science with Python?</li> <li>• Different phases of a typical Financial Analytics projects</li> <li>• Supervised Learning, Semi-Supervised and Unsupervised Learning</li> <li>• Regression vs. Classification</li> </ul> <p><b>PYTHON PROGRAMMING</b></p> <ul style="list-style-type: none"> <li>• Overview of Python- Starting with Python</li> <li>• Python data types: Primitive</li> <li>• Core built-in data structures – Lists, Tuples, Dictionaries, Sets</li> <li>• String, String built-in methods</li> <li>• Data manipulation tools (Operators, Functions, Packages, control structures, Loops, arrays etc)</li> <li>• Loops and Conditional statements (for, while loop)</li> <li>• Python UDFs – def keywords</li> </ul>
<b>TERM 2</b>	<p><b>WORKING WITH NUMPY</b></p> <ul style="list-style-type: none"> <li>• Numpy Overview</li> <li>• Properties, Purpose, and Types of ndarray</li> <li>• Class and Attributes of ndarray Object</li> <li>• Basic Operations: Concept and Examples</li> <li>• Accessing Array</li> <li>• Elements: Indexing, Slicing, Iteration, Indexing with Boolean Arrays</li> <li>• Shape Manipulation &amp; Broadcasting</li> <li>• Linear Algebra using numpy</li> <li>• Stacking and resizing the array</li> </ul> <p><b>DATA MANIPULATION – CLEANSING – MUNGING USING PANDAS</b></p> <ul style="list-style-type: none"> <li>• Import data from spreadsheets, text files and statistical formats like SPSS.</li> <li>• Cleansing Data with Python</li> <li>• Data Manipulation steps (Sorting, filtering, duplicates, merging, appending, subsetting, derived variables, sampling, Data type conversions, renaming, formatting etc)</li> </ul>

- Scaling and Normalizing data
- Pre-processing and Formatting data
- Feature selection – Correlation etc.. Basic Statistics - Measures of Central Tendencies and Variance
- Important Python packages for data manipulation.

#### **DATA ANALYSIS – VISUALIZATION USING PYTHON**

- Introduction exploratory data analysis
- Descriptive statistics, Frequency Tables and summarization
- Univariate Analysis (Distribution of data & Graphical Analysis)
- Bivariate Analysis (Cross Tabs, Distributions & Relationships, Graphical Analysis)
- Creating Graphs- Bar/pie/line chart/histogram/ boxplot/ scatter/ density/Correlation etc.)
- Introduction to Spatial Analysis
- Sub plotting,

#### **PROJECTS TERM1 & TERM2**

- Facebook Shares Time Series Data with interesting insights.
- EDA, Data Mangling and Visualizing using Microsoft Financial Data.
- Insights & Analysis Daily Percentage Change, Cumulative Daily Returns, Comparing Daily Returns using Stock Data

### **TERM 3**

#### **IMPLEMENTATION OF STATS METHODS**

- Basic Statistics - Measures of Central Tendencies and Variance
- Building blocks - Probability Distributions - Normal distribution
- Central Tendency, Standard Deviation
- Quartiles, IQR, Boxplot, Outliers
- Skewness, Kurtosis
- Hypothesis Testing – Anova, t-Test, P Values
- PCA t-Distr. Stochastic Neigh. Emb. (t-SNE)
- Empirical Distribution

#### **MACHINE LEARNING FOUNDATION**

- Introduction to Machine Learning & Predictive Modeling
- Types of Business problems - Mapping of Techniques - Regression vs. classification vs. segmentation vs. Forecasting
- Major Classes of Learning Algorithms -Supervised vs Unsupervised Learning
- Different Phases of Predictive Modeling (Data Pre-processing, Sampling, Model Building, Validation)
- Overfitting (Bias-Variance Trade off) & Performance Metrics
- Feature engineering & dimension reduction
- Concept of optimization & cost function
- Concept of Cross validation (Bootstrapping, K-Fold validation etc.)

#### **MACHINE LEARNING ALGORITHMS & APPLICATIONS**

##### **REGRESSION**

- Regression Problem Analysis
- Mathematical modelling of Regression Model
- Gradient Descent Algorithm

	<ul style="list-style-type: none"> <li>• Use cases</li> <li>• Regression Table</li> <li>• Model Specification</li> <li>• L1 &amp; L2 Regularization</li> <li>• Optimizers</li> <li>• Polynomial Linear Regression</li> <li>• Data sources for Linear regression</li> <li>• Parameters &amp; Hyperparameters</li> <li>• Cost Function &amp; Cost Optimizer: Gradient Descent Algorithm</li> <li>• Algorithm Metrics R Squared &amp; Adj. Squared</li> </ul> <p><b>PROJECTS TERM3</b></p> <ul style="list-style-type: none"> <li>• Hypothesis Testing, P Value, Estimate Average Stock Return on Financial Data</li> <li>• Forecasting Google Shares: Regression Analysis &amp; Predictive using on Google Shares Price</li> </ul>
<p><b>TERM 4</b></p>	<p><b>TIME SERIES FUNDAMENTALS</b></p> <ul style="list-style-type: none"> <li>• Time Series Dataset</li> <li>• Collect Trading Data with Pandas Library</li> <li>• Time Series Vectors and Lags</li> <li>• Stationarity</li> <li>• EWMA and Smoothers</li> <li>• ETS Decomposition</li> <li>• Time Series Analysis by State Space Methods</li> </ul> <p><b>SIMPLE TIME SERIES</b></p> <ul style="list-style-type: none"> <li>• Autocorrelation Function</li> <li>• Compute the ACF, PACF</li> <li>• White Noise</li> <li>• Random Walk</li> <li>• Generate a Random Walk, Get the Drift</li> <li>• How About Stock Returns?</li> <li>• Seasonal Adjustment During Tax Season</li> </ul> <p><b>ARIMA &amp; SARIMA – TIME SERIES FORECASTING</b></p> <ul style="list-style-type: none"> <li>• ARIMA Models for Univariate</li> <li>• ARIMA Parameter Selection</li> <li>• ARIMA Residuals</li> <li>• Manual ARIMA Model Calculation</li> <li>• Identify ARIMA Model Parameters: General Rules</li> <li>• ARIMA Forecasts</li> <li>• SARIMA Forecasting</li> <li>• Compare AR Model with Random Walk</li> </ul> <p><b>PROJECTS TERM 4:</b></p> <ul style="list-style-type: none"> <li>• Car Stock Market Analysis: Analyzing stock data related to car companies like Tesla vs Ford vs GM from Jan 2012 to Jan 2020.</li> <li>• Stats Model Analysis: Decomposition, Stationarity Testing, Differencing, Autocorrelation Plots and Interpretation.</li> </ul>

	<ul style="list-style-type: none"> <li>• Monthly Production Forecasting: ARIMA and SARIMA monthly Production Time Series Forecasting.</li> </ul>
<b>TERM 5</b>	<p><b>INTRODUCTION TO PORTFOLIO ALLOCATION RISK MANAGEMENT</b></p> <ul style="list-style-type: none"> <li>• How to measure volatility - Volatility Calculation</li> <li>• Investment, Portfolio Value, Portfolio Statistics</li> <li>• Shape Ratio</li> <li>• Ordinary Least-Squares Regression</li> <li>• Univariate Investment Risk</li> <li>• Portfolio Investing Factor Investing Forecasting</li> <li>• Reducing Risk</li> <li>• Implementation of Back Test Strategy</li> </ul> <p><b>FINANCE FUNDAMENTALS &amp; STRATEGY</b></p> <ul style="list-style-type: none"> <li>• Portfolio Optimization</li> <li>• Monte Carlo Simulation</li> <li>• Functionalize Return and SR operations</li> <li>• Efficient Frontier</li> <li>• Creating our Machine Learning Classifiers</li> <li>• CAPM</li> </ul> <p><b>BETTER INVESTMENT DECISIONS – PIOTROSKI F-SCORE</b></p> <ul style="list-style-type: none"> <li>• Piotroski F-score Model</li> <li>• Profitability, Funding, Efficiency Investment Strategy</li> </ul> <p><b>QUANT FINANCE</b></p> <ul style="list-style-type: none"> <li>• Initialize, Before Trading, &amp; Handle Data</li> <li>• Context &amp; Order Target Percent</li> <li>• Order Types &amp; Short Selling</li> <li>• Schedule Function &amp; Portfolio Rebalancing</li> <li>• Historical Data</li> <li>• Closing Positions &amp; Conclusion</li> </ul> <p><b>PROJECT TERM 5</b></p> <ul style="list-style-type: none"> <li>• Financial Portfolio Allocation and Optimization: Portfolio Values, Statistics, Sharpe Ratio.</li> <li>• Piotroski F-score: F-Score calculation, how good Piotroski F-score predicts stock returns, Plotting the Petroski F-Score.</li> <li>• Trading Strategy on Financial Data: Implementation of Financial Back testing, First Trading Algorithm</li> </ul>

## Training Highlights

- **30+ Hours live online Instructor-led Hands-on based learning with Projects.**
- **Training includes:** Soft copy of Training material, Training PPT's, Project code & Training Recording.
- Training **certificate of completion** will be provided to each Attendee.

## Who can attend?

- Training is best suitable for Engineering college faculty, Research scholar, Student & Working IT Professional.

### **EduxLabs Teams**

(Esoir Business Solutions Gurugram)

**M: +91-7053133032 | 8318635606**

**Email** [info@eduxlabs.com](mailto:info@eduxlabs.com) | [www.eduxlabs.com](http://www.eduxlabs.com)