

<b>COURSE TITLE</b>	<b>ARTIFICIAL INTELLIGENCE IN FINANCE</b>
<b>COURSE CODE</b>	<b>05MF0303</b>
<b>COURSE CREDITS</b>	<b>4</b>

**Objective:**

- 1 Develop a foundational understanding of machine learning (ML) techniques and their applications in financial data analysis.
- 2 Learn how to process, clean, and analyze financial datasets for insights.
- 3 Apply regression, classification, and time-series models to predict stock prices, detect fraud, and assess credit risk.
- 4 Understand how AI is used in algorithmic trading, risk management, and sentiment analysis in financial markets.

**Course Outcomes:** After completion of this course, student will be able to:

- 1 Apply ML Techniques to Financial Data – Students will be able to use Python libraries (Pandas, NumPy, Scikit-learn) to analyze and process financial datasets.
- 2 Develop Predictive Financial Models – Implement regression and classification algorithms to forecast market trends and detect fraud.
- 3 Perform Advanced Data Analysis – Utilize feature engineering, time series analysis, and correlation techniques for financial applications.
- 4 Understand AI in Financial Markets – Gain insights into AI-driven trading, risk management, and sentiment analysis for market predictions.

**Pre-requisite of course:**NA

**Teaching and Examination Scheme**

<b>Theory Hours</b>	<b>Tutorial Hours</b>	<b>Practical Hours</b>	<b>ESE</b>	<b>IA</b>	<b>CSE</b>	<b>Viva</b>	<b>Term Work</b>
3	0	2	50	30	20	25	25

<b>Contents : Unit</b>	<b>Topics</b>	<b>Contact Hours</b>
1	<b>Introduction to Machine Learning in Finance</b> Introduction to AI & Machine Learning in Finance, Understanding Financial Data: Stock Prices, Loan Data, Credit Scores, Supervised vs. Unsupervised Learning in Finance, Basics of Python Libraries: Pandas, NumPy, Scikit-learn, Data Preprocessing & Handling Missing Values, Introduction to Exploratory Data Analysis (EDA)	8
2	<b>Regression and Classification Models in Finance</b> Linear Regression for Financial Forecasting, Multiple Regression: Predicting Market Trends, Logistic Regression for Fraud Detection, Decision Trees for Credit Risk Assessment, Performance Metrics: Accuracy, Precision, Recall, F1-Score, Case Study: Loan Default Prediction	10

<b>Contents : Unit</b>	<b>Topics</b>	<b>Contact Hours</b>
3	<b>Advanced EDA and ML Implementation in Finance</b> Handling Outliers & Data Imbalance in Financial Datasets, Correlation Analysis of Financial Indicators, Feature Engineering for Financial Data, Time Series Analysis Basics, Implementing Support Vector Machine (SVM) for Financial Classification, Case Study: Fraud Detection using Transaction Data	12
4	<b>AI Applications in Financial Markets</b> AI in Algorithmic Trading, Risk Management using AI, AI-based Sentiment Analysis for Market Predictions, Introduction to Reinforcement Learning in Trading (Concept Only), AI Ethics & Regulations in FinTech, Capstone Project Discussion	15
<b>Total Hours</b>		<b>45</b>

#### Suggested List of Experiments:

<b>Contents : Unit</b>	<b>Topics</b>	<b>Contact Hours</b>
1	<b>Unit 1</b> Dataset Handling: Load and clean a financial dataset (e.g., stock market, loan approval), EDA & Visualization: Perform basic exploratory analysis (summary statistics, missing values, visualizations).	15
2	<b>Unit 2</b> Stock Price Prediction: Build a simple Linear Regression model using historical stock prices, Credit Risk Analysis: Develop a Decision Tree model for predicting loan default risk.	15
3	<b>Unit 3</b> Time Series Analysis: Explore trends in stock prices and interest rates using Python, Fraud Detection: Use Logistic Regression or Decision Trees to classify fraudulent transactions.	15
4	<b>Unit 4</b> AI-powered Trading Simulation: Implement a basic trading strategy using historical stock data.	15
<b>Total Hours</b>		<b>60</b>

#### Textbook :

- 1 Artificial Intelligence in Finance: A Python-Based Guide, Yves Hilpisch, O'Reilly Media, 2020
- 2 Machine Learning for Asset Managers, Marcos López de Prado, Cambridge University Press, 2020

#### References:

- 1 Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems, Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems, Aurélien Géron, O'Reilly Media, 2019

**References:**

- 2 Advances in Financial Machine Learning, Advances in Financial Machine Learning, Marcos López de Prado, Wiley, 2018

**Suggested Theory Distribution:**

The suggested theory distribution as per Bloom’s taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
10.00	20.00	25.00	25.00	10.00	10.00

**Instructional Method:**

- 1 Demo, Practical, Board work

**Supplementary Resources:**

- 1 <https://www.ibm.com/think/topics/artificial-intelligence-finance>
- 2 <https://link.springer.com/article/10.1007/s43546-023-00618-x>
- 3 <https://cloud.google.com/discover/finance-ai>
- 4 <https://kpmg.com/xx/en/our-insights/ai-and-technology/kpmg-global-ai-in-finance-report.html>
- 5 <https://www.datacamp.com/blog/ai-in-finance>
- 6 <https://www.oracle.com/erp/financials/ai-finance/>
- 7 <https://www.a3logics.com/blog/ai-in-the-finance/>