

COURSE TITLE	QUANTITATIVE FINANCE
COURSE CODE	05MF0201
COURSE CREDITS	4

Objective:

- 1 To understand about Quantitative Finance & its role in FinTech innovation and Quantitative Methods and Modelling Techniques.
- 2 To impart a thorough understanding about Probability Distribution and also with Statistical Inference
- 3 To understand about Regression Model also with Multiple Regression model with more than one Independent Variable.
- 4 To learn about Time Series Analysis and different types of Forecasting Methods.
- 5 To learn and understand appropriate numerical descriptive statistics of Quantitative Finance for the different type of Data.

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

- 1 Student will learn Quantitative Finance encompasses the application of mathematical and statistical principles, including descriptive and inferential statistics, central tendency measures, and correlation analysis, to develop innovative FinTech solutions and trading strategies, leveraging quantitative methods and modelling techniques to analyse financial data and make informed decisions.
- 2 Students will learn Probability theory and statistical inference techniques, including estimation and hypothesis testing for single populations, as well as analysis of variance, are utilized in both discrete and continuous distributions to inform decision-making processes in quantitative finance and data analysis.
- 3 Students will empower with the tools and knowledge of Quantitative Finance. By immersing them in hands-on experiences with mathematical and statistical principles, central tendency measures, and correlation analysis,
- 4 students learn to develop innovative FinTech solutions and trading strategies. Through active engagement with quantitative methods and modelling techniques, they gain the confidence and skills needed to analyse financial data effectively and make informed decisions, paving the way for their success in the dynamic world of finance.
- 5 Students will embelin the analysis of time series data, students will be empowered with diverse forecasting methods, including trend analysis, seasonal and cyclical variations, and error measurement techniques, integrating smoothing techniques and ARIMA models for both stationary and non-stationary time series, enriching their understanding of financial dynamics. Student will be able to learn and understand appropriate numerical descriptive statistics of Quantitative Finance for different types of data, apply probability rules and concepts relating to discrete and continuous random variables to answer questions within a business context. Conduct and interpret a variety of hypothesis tests to aid decision making in a business context. Use simple/multiple regression models to analyses the underlying relationships between the variables through hypothesis testing

Pre-requisite of course:Basic Knowledge about Finance

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
4	0	0	50	30	20	0	0
Contents : Unit	Topics						Contact Hours
1	Introduction to Quantitative Finance - Introduction to Quantitative Finance, its role in FinTech innovation, quantitative mathematical foundations, quantitative trading strategies , - Quantitative Methods and Modelling Techniques, Descriptive and inferential statistics - Frequency Distributions, Statistics, - Central Tendency, Mean, Median, Mode, Measures of Shape, Standard deviation, Covariance, Correlation.						15
2	Probability Distribution - Probability, Discrete Distributions, Continuous Distributions , - Statistical Inference: Estimation for Single Populations , - Inference: Hypothesis, Testing for Single Populations, Analysis of Variance.						15
3	Regression Model & Standard Error of Estimate - Introduction to Simple Linear Regression, Determination of Intercept and coefficient of Regression, Coefficient of Determination , - Standard Error of Estimate, Measuring, Autocorrelation, - Durbin Watson Statistics, testing of slope, estimate of population of coefficient of regression, testing the Overall Model, , - Multiple Regression model with more than one Independent Variable, Determination of Coefficient of Multiple Determination (R ²), Adjusted R ² , Standard Error of Estimate, Testing Assumptions of Linear Regression.						15
4	Time Series Analysis - Time Series Analysis, Types of Forecasting Methods Components of Time Series, Secular Trend, Trends & Volatility, Distributional Transformations, Seasonal Variations, Cyclical Variations, Random Variations, , - The Additive Model and Multiplicative Model, Measurements of Error in Forecasting (MAD, MAPE, RMSE), Smoothing Techniques, Moving Averages Method, Weighted Moving Averages Method Exponential Smoothing Method, Double Exponential Smoothing Method, , - ARMA Models for Stationary Time Series, ARMA Models for Non-Stationary Time Series, ARIMA Models for Stationary Time Series, ARIMA Models for Non-Stationary Time Series, Testing for a Unit, Root, Trend versus Difference Stationarity.						15
Total Hours							60

Textbook :

- 1 Quantitative Finance: A Simulation-Based Introduction Using Excel, Matt Davison, CRC Press., 2014

References:

- 1 Quantitative Financial Economics: Stocks, Bonds, and Foreign Exchange, Quantitative Financial Economics: Stocks, Bonds, and Foreign Exchange, Keith Cuthbertson and Dirk Nitzsche, Wiley., 2015
- 2 Statistics for Business and Economics, Statistics for Business and Economics, Paul Newbold, William L. Carlson, and Betty Thorne, Pearson., 2019
- 3 Time Series Analysis: Forecasting and Control, Time Series Analysis: Forecasting and Control, George E. P. Box, Gwilym M. Jenkins, Gregory C. Reinsel, and Greta M. Ljung, Wiley., 2015
- 4 Applied Linear Statistical Models, Applied Linear Statistical Models, Michael H. Kutner, Christopher J. Nachtsheim, John Neter, and William Li, McGraw-Hill/Irwin., 2005

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 PPT
- 2 Board Work

Supplementary Resources:

- 1 <https://www.investopedia.com/terms/q/quantitativeanalysis.asp>
- 2 <https://www.quantstart.com/>