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| **Course Code** | | | **Course Title** | | | | | | **L** | | **T** | **P** | **C** |
| **UCCA336E** | | | **Analytics for Finance** | | | | | | **2** | | **0** | **2** | **3** |
| **Pre-requisite** | | | **Nil** | | | | **Syllabus version** | | | | | | |
|  | | |  | | | | **1.0** | | | | | | |
| **Course Objectives** | | | | | | | | | | | | | |
| 1. To understand the Basic concepts of R. 2. To know the need and significance of Financial Analytics for various business requirements. 3. To analyse financial data using various R packages. | | | | | | | | | | | | | |
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| **Course Outcomes** | | | | | | | | | | | | | |
| On successful completion of this Course, the students will be able to,   1. Carry out statistical analysis of financial data using R. 2. Learn and apply the financial analytics process in R. 3. Employ R for market analysis and trading strategies**.** 4. Construct financial predictions with R. 5. Create impactful financial visualizations with R. 6. Obtain foundational knowledge of Web integration. | | | | | | | | | | | | | |
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| **Module:1** | | **Financial Analytics** | | | | | | **4 hours** | | | | | |
| Introduction: Meaning-Importance-Uses-Features; Documents used in Financial Analytics: Balance Sheet, Income Statement, Cash flow statement-Elements of Financial Health: Liquidity, Leverage, Profitability. Analysts: Roles and Responsibilities Information and Knowledge-Methodology-Data-Required Competencies for the Analyst-Hypothesis Driven Methods. | | | | | | | | | | | | | |
| **Module:2** | | **Financial Analytics with R** | | | | | | **5 hours** | | | | | |
| Introduction to R: features- function, application, and types. Financial Statistics: Concept and mathematical expectation - Probability - Mean; SD and Variance - Skewness and Kurtosis - Covariance and correlation. Financial Securities: Bond and Stock investments - Securities Datasets and Visualization. Time Series and Sharpe ratio: Examining and Stationary - Auto Regressive and integrated moving average Processes. | | | | | | | | | | | | | |
| **Module:3** | | **Applications of Financial Analytics using R** | | | | | | **4 hours** | | | | | |
| Gauging the market sentiment: Mark or Regime Switching model - Bayesian reasoning - Beta distribution. Stimulating Trading Strategies: Foreign exchange markets - Chart analytics - Initialization and finalization - Bayesian Reasoning within Positions. | | | | | | | | | | | | | |
| **Module:4** | | **Prediction using R** | | | | | | **4 hours** | | | | | |
| Prediction using fundamentals and binomial model for options: Best income statement Portfolio - obtaining Price Statistics - combining the income statement with Price statistics. Applying Computational finance - Risk Neutral Pricing and No Arbitrage - High Risk - Free Rate Environment | | | | | | | | | | | | | |
| **Module:5** | | **Basic Graphical Packages of R** | | | | | | **4 hours** | | | | | |
| Introduction to R's Graphical Capabilities - Overview of basic plotting functions in R. Visualizing Financial Data - Introduction to time series plots: line charts and candlestick charts, Plotting financial indicators: moving averages and Bollinger Bands, Visualizing data distributions: density plots and violin plots, Real-world applications and examples. | | | | | | | | | | | | | |
| **Module:6** | | **Advance Graphical Packages of R** | | | | | | **3 hours** | | | | | |
| Introduction to the ggplot2 package- Creating Interactive Graphics with plotly - converting ggplot2 graphs to interactive plotly graphs, Interactive features: tooltips and zooming | | | | | | | | | | | | | |
| **Module:7** | | **Web Integration Applications** | | | | | | **4 hours** | | | | | |
| Web Integration- Web Basics- Web Plotting- Static Plots- Interactive Plots- Real-Time Plots-Rapid Web Applications- Web Services Graphical Package of R – To Display the Stats – Interactive dashboards | | | | | | | | | | | | | |
| **Module:8** | | **Contemporary Issues** | | | | | | **2 hours** | | | | | |
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|  | | **Total Lecture hours:** | | | | | | **30 hours** | | | | | |
| **Text Book(s)** | | | | | | | | | | | | | |
| 1. | Mark J. Bennets, Financial Analytics with R (2016), Cambridge University Press. | | | | | | | | | | | | |
| 2. | Simon Benninga and Tal Mofkadi (2021), Financial Modeling, 5th edition, MIT press, Cambridge | | | | | | | | | | | | |
| 3. | Jean-Francois Collard, (2022), Hands-On Data Analysis in R for Finance, Taylor & Francis. | | | | | | | | | | | | |
| **Reference Books** | | | | | | | | | | | | | |
| 1. | David Ruppert and David Matteson (2015), Statistics and Data Analysis for Financial Engineering with R example, Springer Nature. | | | | | | | | | | | | |
| 2. | Christoph Scheuch and Stefan Voigt. Tidy Finance with R (2023), (Chapman & Hall/CRC The R Series) | | | | | | | | | | | | |
| 3. | John Fry and Matthew Burke (2022), Quantitative Methods in Finance using R Open University Press. | | | | | | | | | | | | |
| **Lab Experiments**  The following lab experiments could be planned using R. | | | | | | | | | | | | | |
| 1. | Basic of R: Syntax, data types, operators, control flow statements, and functions | | | | | | | | | | | | |
| 2. | Time series analysis | | | | | | | | | | | | |
| 3. | Data plotting and Visualization | | | | | | | | | | | | |
| 4. | Markov Regime Switching Model and Bayesian Reasoning application | | | | | | | | | | | | |
| 5. | Portfolio analysis and Optimization | | | | | | | | | | | | |
| 6. | Binomial model implementation | | | | | | | | | | | | |
| 7. | **Machine Learning: Caret** (classification & regression), (Random Forests) | | | | | | | | | | | | |
| 8. | Applying web integration, web-plotting, and web services | | | | | | | | | | | | |
| **Total Laboratory Hours** | | | | | | | | | | **30 hours** | | | |
| Mode of Evaluation: CAT, Quiz, Digital Assignments and FAT | | | | | | | | | | | | | |
| Recommended by Board of Studies | | | | 24-05-2024 | | | | | | | | | |
| Approved by Academic Council | | | | No. 76 | Date | 28-11-2024 | | | | | | | |