Course Type	Course Code	Name of Course	L	T	P	Credit
DE	NMSD522	Computational Finance	3	0	0	3

Course Objective
• The aim of this course is to give exposure to the basics of financial modeling and its application to the financial markets.
Learning Outcomes
• To develop the basics understanding of tools and techniques for financial modeling and its application to the financial markets. • Able to apply Advanced Univariate and Multivariate Models for financial Modelling • Able to understand, build and estimates the financial forecasting models. • To develop an understanding of the concepts of modeling, measuring and managing financial risk.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	**Introduction to Computational Finance and Financial Modelling**: Scope and Applications of Computational Finance, Fundamental Theories in Finance and Financial Modelling, Techniques to Prepare Financial Data for Modelling using Statistical Software, Choice of Univariate and Multivariate Statistical Techniques for Financial Data Analysis using Statistical Software	8	To develop the basic understanding ofunivariate and multivariate statistical techniques for financial data analysis
2	**Financial Forecasting Tools and Techniques**: Introduction to Forecasting Methods for Financial Data, Application of Forecasting Tools and Techniques using Statistical Software, Measuring Forecast Accuracy using Statistical Software	6	To familiarize the student with the financial forecasting and its tools and techniques
3	**Financial Risk Modelling**: Introduction to Financial Risk Modelling, Foundations of Risk Management, Introduction to statistics and econometrics for Modelling Financial Risk factors	6	Understanding the concepts of financial risk and modeling of financial risk factors
4	**Market Risk Management**: Introduction to Market Risk, Scope of Market Risk in Equity, bond, derivatives and forex markets, Market Risk Management, Advanced Univariate and Multivariate Models for Risk Modelling: VAR	10	To make student conversant with financial risk management and introduce them to models for market risk modeling

	/backtesting/stress testing/scenario /sensitivity analysis etc. using statistical software		
5	**Credit and Operational Risk Management:** Introduction to Credit and Operational Risk, Scope of credit and operational risk in financial markets, Techniques for Modelling credit and operational Risk: Probability of default/loss given default, Risk-Adjusted performance, Basel norms etc., Evolving issues in Risk Management.	6	To familiarize the student with credit and operational risk management and techniques for modeling credit and operational Risk
6	**Principal Component Analysis (PCA) and Cluster Analysis**: Application of Principal Component Analysis (PCA) and Cluster Analysis in Financial Modelling using Statistical Software: Scope and Introduction to the Techniques, Potential Applications, Assessing the Validation of the Models	6	Understanding the scope of Principal Component Analysis and Cluster Analysis and its application in Financial Modelling
	Total	**42**	

Text Books:

1. Financial Risk Manager Handbook by Philippe Jorion, 6th Edition, John Wiley & Sons Inc. (2003)
2. Forecasting Methods and Applications by Makridakis, S., Wheelwright, S. C., & Hyndman, R. J., 3rd Edition, John Wiley & Sons Inc. (2008)
3. Analyzing Multivariate Data by Lattin, J. M., Carroll, J. D., & Green, P. E., 1st Edition, Cengage Learning India. (2006).

Note: Case Studies and relevant research papers will be provided by the instructor