

Course Code	Course Title	L	T	P	C
OLMDS607	Financial Data Analytics	3	1	0	4
Pre-requisite	NIL	Syllabus version			
		1.0			
Course Objectives					
1. To learn to model financial time series using linear ARMA type time series.					
2. To study and analyze to test and model heteroscedastic effects using ARCH /GARCH type time series.					
3. To learn how to test for unit root and construct ARMA models.					
Course Outcomes					
At the end of the course, the student will be able to					
1. Approach and analyze any financial data.					
2. Differentiate between various time series models.					
3. Perform cross-validation of various financial models developed.					
4. Forecast future observations on financial data.					
Module:1 Financial data and their properties					
Asset Returns – Bond Yields and Prices – Implied Volatility – Examples and Visualization of financial data – Multivariate returns.					
Module:2 Linear models for financial time series					
Simple autoregressive models – Simple moving average models – Simple ARMA models – Unit Root non-stationarity – Exponential smoothing.					
Module:3 Seasonal and Long memory models					
Seasonal models – Regression models with time series errors – Long memory models.					
Module:4 Asset Volatility and Volatility models					
Characteristics of Volatility – Structure of a model – Testing for ARCH Effect – ARCH Model – GARCH Model – GARCH-M Model – Exponential GARCH Model – Threshold GARCH model – Stochastic volatility model – alternative approaches.					
Module:5 Applications of Volatility Models					
GARCH Volatility Term structure – Option pricing and hedging – Time Varying Correlations and Betas – Minimum Variance Portfolios – Prediction.					
Module:6 High Frequency Financial Data					
Nonsynchronous trading – Bid ask spread of trading prices – Empirical characteristics of trading data – Models for price changes.					
Module:7 Value at Risk					
Risk measure and Coherence – Risk metrics – Extreme value approach to Value at Risk – Peak over thresholds.					
	Total Lecture hours:	120 hours			
Text Book(s)					
1.	Ruey S. Tsay An Introduction to Analysis of Financial Data with R, Wiley, 2013.				
Reference Books					
1.	Analysis of Financial Time Series, by Ruey S. Tsay, 3rd edition, Wiley Series in Probability and Statistics, 2010.				
2.	William G. Foote, Financial Engineering Analytics: A Practice Manual Using R, 2018.				

3.	Statistical Analysis of Financial Data in S Plus, by R Carmona, Springer, April, 2004.		
Mode of Evaluation: CAT / written assignment / Quiz / FAT.			
Recommended by Board of Studies		16-10-2023	
Approved by Academic Council		No. 72	Date 13-12-2023