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• Stationary Process and ARMA Models  
 o Basic properties and linear processes  
 o Introduction to ARMA models, properties of sample mean and autocorrelation function  
 o Forecasting stationary time series  
 o ARMA(p, q) processes, ACF and PACF  
 o Forecasting of ARMA processes  
• Modeling and Forecasting with ARMA Processes  
 o Preliminary estimation  
 o Maximum likelihood estimation  
 o Diagnostics  
 o Forecasting  
 o Order selection  
• Nonstationary and Seasonal Time Series Models  
 o ARIMA models  
 o Identification techniques  
 o Unit roots in time series  
 o Forecasting ARIMA models  
 o Seasonal ARIMA models  
 o Regression with ARMA errors  
• Multivariate Time Series  
 o Second-order properties of multivariate time series  
 o Estimation of the mean and covariance  
 o Multivariate ARMA processes  
 o Best linear predictors of second-order random vectors  
 o Modeling and forecasting  
• State-Space Models  
 o State-space representations  
 o The basic structure model  
 o State-space representation of ARIMA models  
 o The Kalman Recursions  
 o Estimation for state-space models  
• Forecasting Techniques  
 o The ARAR algorithm  
 o The Holt-Winter algorithm  
 o The Holt-Winter seasonal algorithm

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• Basic Properties of time-series data  
 o Distribution and moments  
 o Stationarity  
 o Autocorrelation  
 o Heteroscedasticity  
 o Normality  
• Autoregressive models and forecasting  
 o AR models  
 o ARMA models  
 o ARIMA models  
• Random walk model  
 o Non-stationarity and unit-root process  
 o Drift and Trend models  
• Regression analysis with time-series data using R programming  
• Principal Component Analysis (PCA) and Factor Analysis  
• Conditional Heteroscedastic Models  
 o ARCH  
 o GARCH  
 o T-GARCH  
 o BEKK-GARCH  
• Introduction to Non-linear and regime-switching models  
 o Markov regime-switching models  
 o Quantile regression  
 o Contagion models  
• Introduction to Vector Auto-regressive (VAR) models  
 o Impulse Response Function (IRF)  
 o Error Correction Models  
 o Co-integration  
• Introduction to Panel data models  
 o Fixed-Effect models  
 o Random-Effect models

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• Microeconomics  
 o How does the market work: supply, demand and equilibrium  
 o Consumer and producer choices: elasticities of supply and demand  
 o Competitive, monopolistic and oligopolistic markets and strategic behavior of firms  
 o Public versus private goods; common resources; externalities  
 o Labour markets and wage determination  
 o The theory of consumer choice  
 o Frontiers in Microeconomics research  
• Macroeconomics  
 o Measurement of national economy, GDP calculations  
 o Cost of living comparisons; measurements; price and GDP adjustors  
 o Productivity and growth; productivity models  
 o Money and Inflation  
 o Unemployment and its impact on national economy; trade-offs between inflation and unemployment  
 o International trade  
 o Open economy

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• Time Series  
 o Meaning and utility of time series  
 o Components of time series: trend, seasonal variations, cyclical variations, irregular (error) fluctuations or noise  
 o Exploratory data analysis: Time series plot to (i) check any trend and seasonality in the time series (ii) identify the nature of trend  
 o Methods of trend estimation and smoothing: (i) moving average, (ii) linear parabolic, exponential, curve fitting by least squares principle (iii) exponential smoothing, Choosing parameters for smoothing and forecasting. Forecasting based on exponential smoothing  
 o Measurement of seasonal variations: i) simple average method, ii) ratio to moving average method, iii) ratio to trend where linear trend is calculated by method of least squares  
 o Fitting of autoregressive model AR(p), where p = 1,2