

Academic Year: ( 2021 / 2022 )

Review date: 30-06-2021

Department assigned to the subject: Department of Statistics

Coordinating teacher: MARIN DIAZARAQUE, JUAN MIGUEL

Type: Electives ECTS Credits : 3.0

Year : 1 Semester : 2

**OBJECTIVES**

Knowledge acquisition of: 1) univariate time series models; 2) multivariate time series models; 3) stochastic volatility models; 4) network analysis and connectivity; 5) visualization techniques in networks; 6) graphical models and modelling of dependency; 7) hidden Markov models; 8) estimation and interpretation of hidden Markov models; 9) basis representation of functional data; 10) regression models with functional prediction/response; 11) classification with functional data.

**DESCRIPTION OF CONTENTS: PROGRAMME**

1. Basic concepts in Time Series Analysis.
  - 1.1. Random samples and properties of time series.
  - 1.2. Decomposition of a time series: trend, seasonality, cycle and noise.
  - 1.3. Stationary transformations for trend and seasonal.
  - 1.4. Deterministic and stochastic components.
2. Linear Univariate ARIMA models.
  - 2.1. Stationarity and differencing.
  - 2.2. Autocorrelation function and its estimation.
  - 2.3. Autoregressive models AR(p).
  - 2.4. Moving Average models MA (q).
  - 2.5. Non seasonal ARIMA models.
  - 2.6. Estimation and order of selection.
  - 2.7. Forecasting.
  - 2.8. Seasonal ARIMA models.
3. Volatility models.
  - 3.1. ARCH and GARCH modelling.
  - 3.2. Testing strategy for heterocedastic models.
  - 3.3. Volatility forecast.
4. Multivariate time series
  - 4.1. Time series regression.
  - 4.2. VAR models.
  - 4.3. Cointegration.
  - 4.4. Forecasting properties.

<b>% end-of-term-examination:</b>	40
<b>% of continuous assessment (assignments, laboratory, practicals...):</b>	60

**BASIC BIBLIOGRAPHY**

- Brockwell P.J. and Davis R.A. Introduction to Time Series and Forecasting., Springer., 2002
- Enders W. Applied Econometric Time Series., Wiley, 2015
- Hamilton J. Time Series Analysis., Princeton University Press, 1994
- Mills T.C. The Econometric Modelling of financial Time Series., Cambridge University Press, 1999

